Winners of Our 20th Annual Photo Contest

Teddy Roosevelt's Deadly Amazon Journey

Facing Belgium's Past Cruelties in Africa

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TRIBUTE TO EARTH DAY

- U.S. COMMUNITIES FIGHT FIRE WITH FIRE
- STUDENTS TREK ALASKAN GLACIERS FOR CREDIT
- FARMERS GENERATE ELECTRICITY FROM WASTE
- A RARE SEA CREATURE MAKES AN APPEARANCE

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PUSHING –the– envelope

How paper is sparking a packaging evolution

The desire for more sustainable paper packaging options by both consumers and companies has been spurring a wave of exciting design innovation that not only can make our lives more convenient—but is also the smart choice for the planet.

2/3 of consumers say they look for recyclable & biodegradable packaging

A monumental shift

The topic of sustainability is nothing new. However, in recent years, many consumers have re-evaluated their priorities and changed how they live, work and shop. From a surge in online shopping that hit record levels during the Covid-19 pandemic, which placed an even a greater spotlight on the need for sustainable, yet durable, packaging, to endless images of plastic waste in our oceans, consumers are demanding change.

A 2022 Harris Poll found that more than half of consumers are especially interested in supporting sustainable brands and would pay more for more sustainable products. Consumers are also passionate about the environment—almost two-thirds say they look for products with packaging that is recyclable and biodegradable, according to The Hartman Group's Sustainability 2021 report. Likewise, many consumer brands have been working to make a shift to renewable, paper-based packaging to help them reach their own sustainability goals, eliminate waste, and reduce both shipping costs and their environmental footprint.

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A wide array of consumer brands have been working with partners in the paper and packaging industry to create paper-based packaging that uses less material and is easily recycled, pushing the envelope on design and revolutionizing the world of product packaging.

Many health and beauty brands are exploring paper-based alternatives, from paper board deodorant tubes to paper bottles and cosmetic tubes. One hundred percent recyclable paper bottles developed by the Paper Bottle Company (Paboco) are made of wood cellulose that is sustainably sourced and FSC® certified, with a biomaterial-based barrier inside the bottle that makes it suitable for liquids, for everything from shampoos and lotions to beverages. Paboco's paper bottles have been trialed by P&G and L'Oréal, as well as companies in other sectors like Carlsberg, Coca-Cola and Absolut.

Paboco is just one company that has been developing fully recyclable paper bottles. Johnnie Walker is planning to roll out paper bottles in 2023, Frugalpac has unveiled the 75-centiliter Frugal Bottle made from 94 percent recycled paperboard with a food-grade liner for wine and spirits, and there are surely many more to follow.

Beverage brands have also been working with partners on several new paper-based alternatives to plastic sixpack rings. The CanCollar Eco Packaging, developed by WestRock and first adopted in 2022 by Grupo Modelo (owner of Corona), is made of recyclable paperboard with cutouts that lock to the tops of cans to hold them in place without the need for glue. Graphic Packaging International has developed an award-winning rounded bottle case for Stella Artois as well as the KeelClip, already being used by Coca-Cola.

Finally, to help alleviate plastic waste connected with the rise in online shipping, e-commerce brands like Amazon have adopted lightweight, durable paper mailers that are easy to recycle, and more are using recyclable paper inside shipping boxes to protect the contents and meet consumer demand for earth-friendly packaging. One example is 3M's Scotch™ Cushion Lock™ Protective Wrap, which expands to 60 times its original volume to fill packing boxes with less material, is made from recycled materials and is easily recycled after use.

As we look to the future and more brands make the shift to recyclable paper packaging, the opportunities for innovation are endless—offering consumers a wider variety of options that they can feel good about.

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Multi-pack wrapping and everyday products are getting a paper makeover

Raising the bar on recycling

Although paper is one of the most recycled materials in the U.S.—in 2021, according to the American Forest & Paper Association, the overall paper recycling rate climbed to 68 percent and 91.4 percent of cardboard boxes were recycled—there is always room for improvement.

Paper companies have been working to achieve their own sustainability goals and drive innovation in paper recycling techniques. One such effort is Georgia Pacific's Juno®, a trailblazing waste recovery technology that can sanitize, wash away food contamination and strip away that pesky plastic coating, which has long been a hindrance in the paper recycling process.

Even used pizza boxes with grease stains and melted cheese are designed to be recycled. That's about 3 billion pizza boxes a year, or 600,000 tons of cardboard material, that can be kept out of landfills and given a new life. Check recycling guidelines in your community to make sure they're accepted.

The paper & paper products we use every day can be recycled up to 7 times

Consumers can also help make the most of this renewable natural resource by better understanding how to properly recycle—and by doing it consistently. According to the 2021 Consumer Recycling Habits survey, people feel better when they recycle, yet 63 percent confess to not doing it regularly. Choosing products that are packaged in paper and striving to raise the bar on recycling will go a long way toward minimizing waste and putting us on a track toward a healthier planet.

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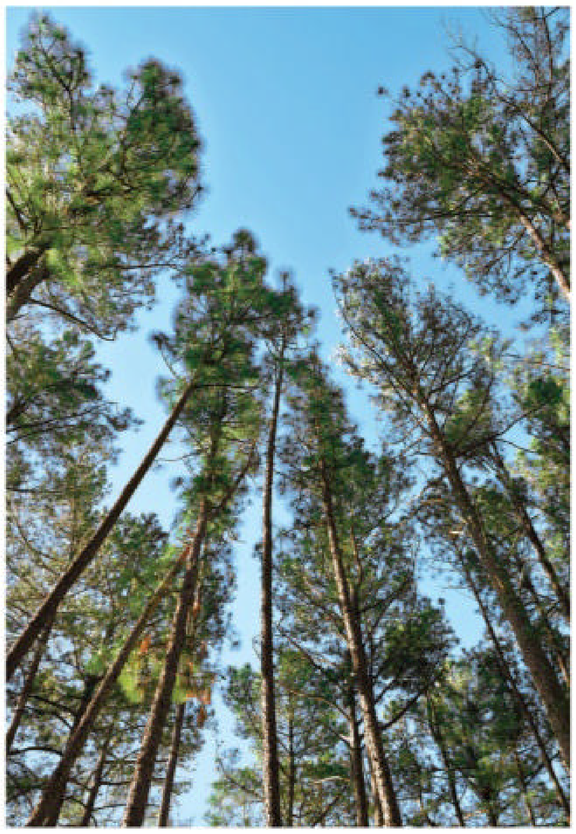

How paper packaging supports our forests

The paper industry is part of a larger movement to grow and protect our forests and the habitats around them through close collaboration with privately owned American forests, which are among the most sustainably managed in the world. These sustainable forests supply more than 90 percent of the wood in the U.S. that make paper and wood products, according to the American Forest & Paper Association.

In the United States, more than half of forestlands are privately owned and managed by about 11 million forest owners across the country. Many of the forests are small, family-owned tracts in rural communities. The landowners spend years carefully cultivating and stewarding the forest, harvesting only what is needed and continually planting to ensure regrowth.

To ensure that our forests are sustainably stewarded and protected, many forestland owners adhere to independent, internationally recognized sustainable forestry certification programs that account for habitat, biodiversity, water and soil quality, and other factors in planning for the long-term health of the land.

A vibrant paper industry enables these landowners to responsibly manage their forestland. Without the income from sustainably grown wood, many landowners would need to develop their land for other use, turning it into farmland or real estate development.

Protecting our forests for a more sustainable future

The efforts by the paper industry and private forest owners have resulted in nearly twice as much wood being grown each year in the United States as being harvested. According to the U.S. Forest Service, one-third of the country is forested, totaling 766 million acres. Approximately 3.5 million trees are planted daily, totaling more than one billion trees a year. And, in the last 30 years, forested areas have increased by nearly 33 million acres—the size of 2,275 football fields of forest growth every day.

Through this collaboration with private landowners, the paper industry is committed to safeguarding and growing our forests through sustainable practices, so this precious resource is not only protected but continues to thrive now and for generations to come. ●

3
simple steps to make recycling more effective

1. EMPTY
Take out any liners or packing materials

2. FLATTEN
Break down the box to make it more compact—there's no need to remove tape or labels

3. RECYCLE
Check with your provider so you know your recycling pick-up/drop-off days and consult the weather report to avoid putting your recycling out in the rain

THIS BOX HAS UP TO 7 LIVES
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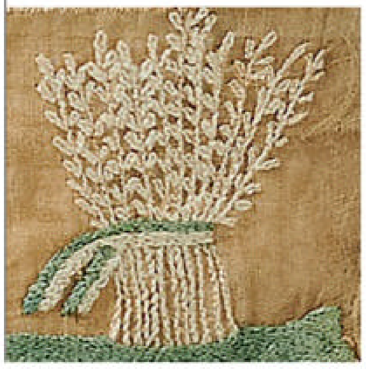

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Cover: The Coronation Chair was built for King Edward I in 1300. Photograph by **Jooney Woodward.**

ANDRIA HAUTAMAKI; KELLY MARSHALL (DETAIL)

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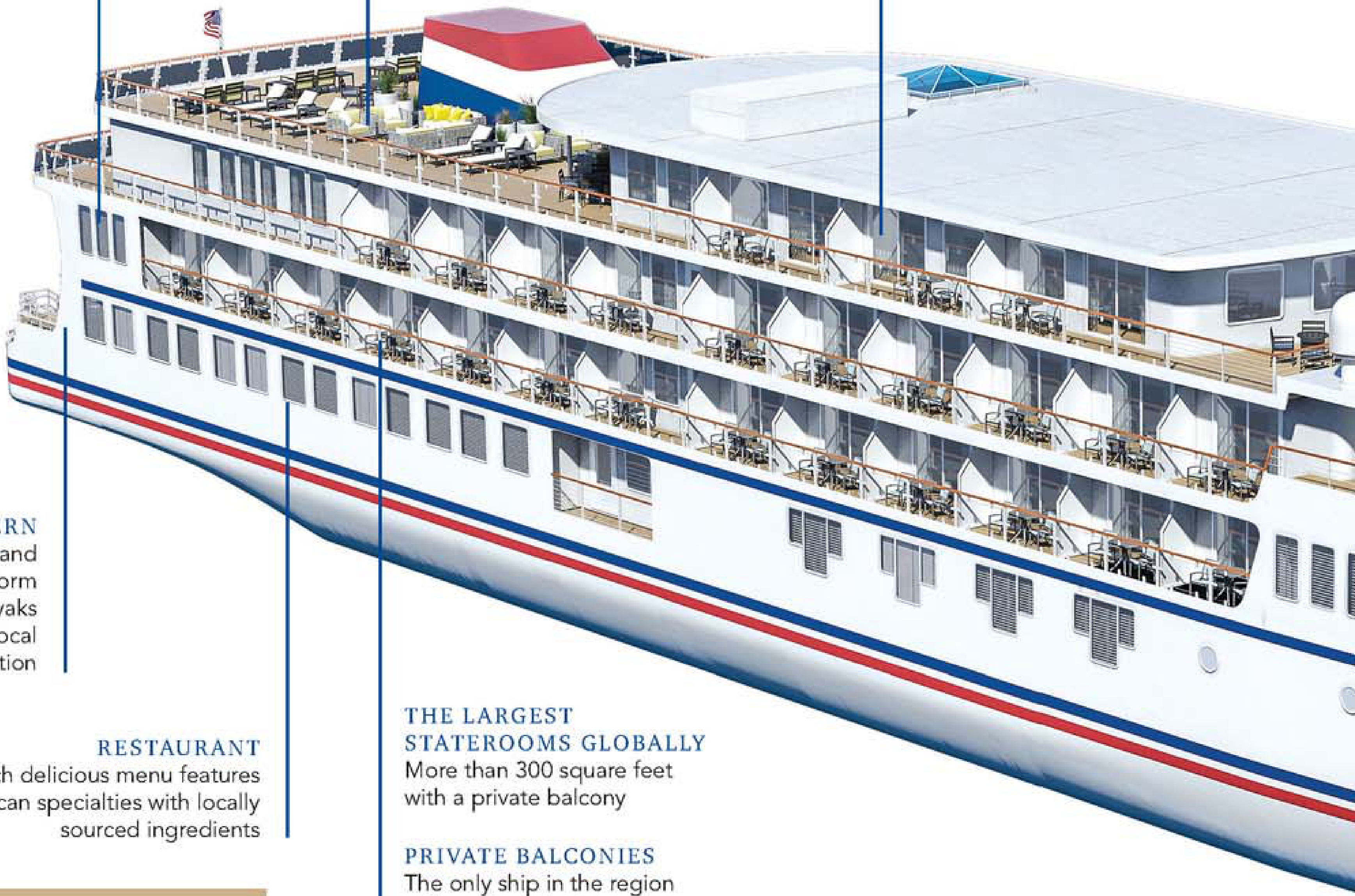

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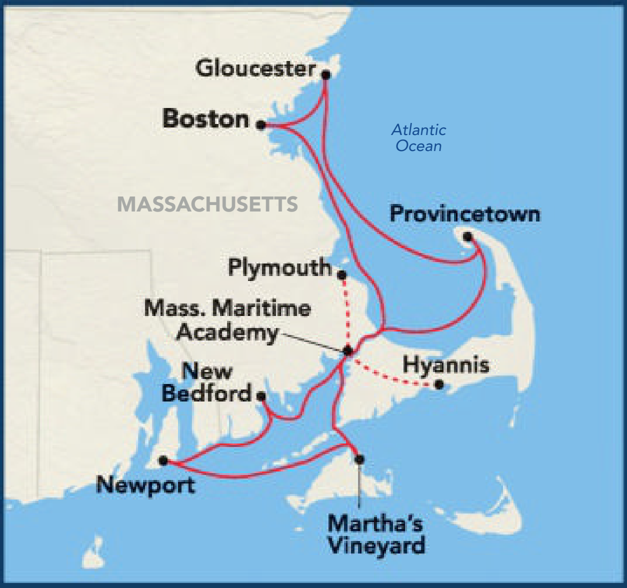
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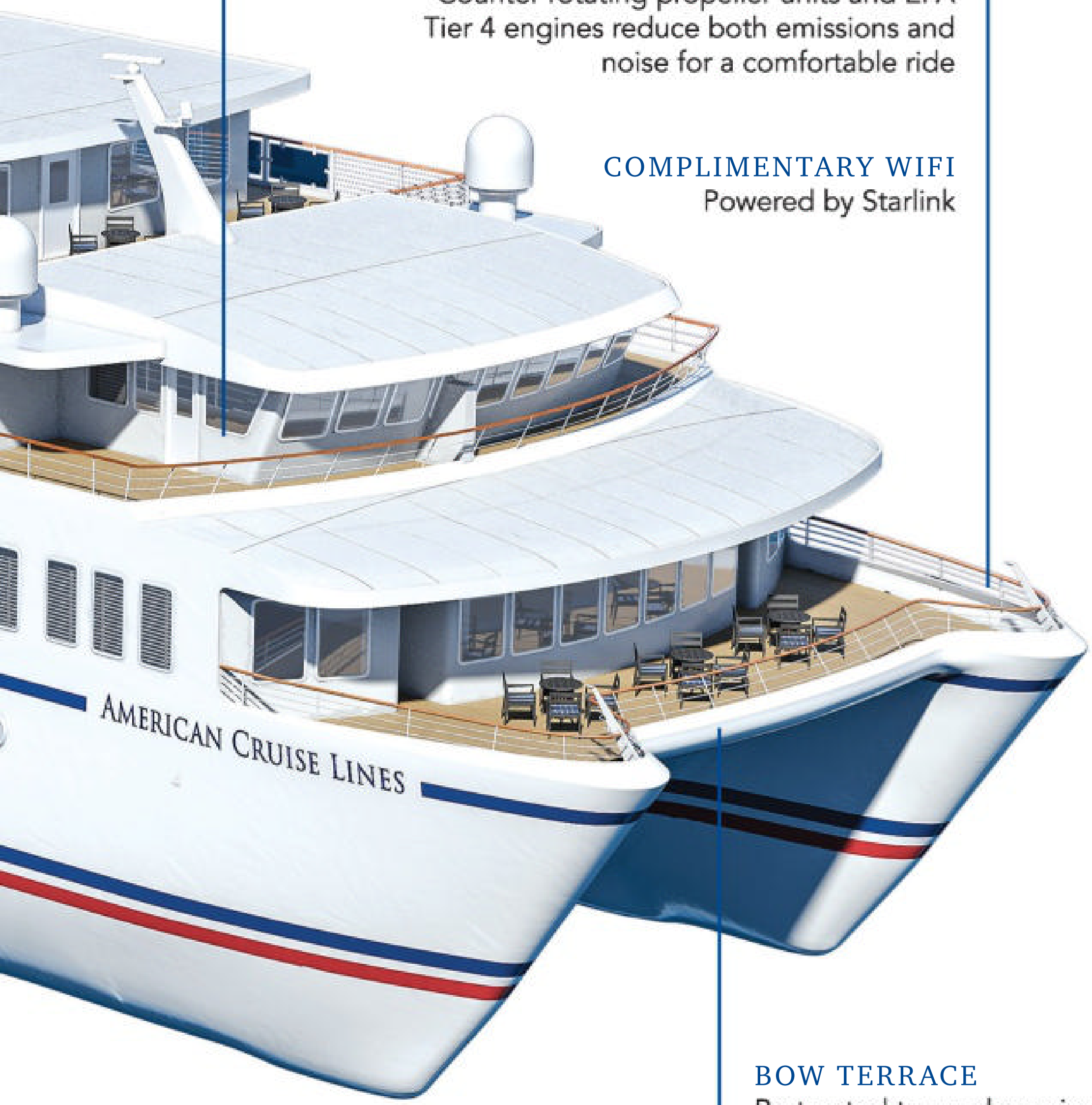
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Meet heroic women soldiers of the 6888th Battalion
Restoring the nation's most enchanted "ruin" garden
How water is revitalizing a Native community in Arizona
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A TOWN IN ICELAND GOES ALL OUT FOR A BELOVED SEABIRD
Saving the Baby Puffins

> “It is lovely to know that this is happening **generation after generation.**”

***Smithsonian* thanks you for your subscription, which supports the Smithsonian Institution’s unique mission to explore the natural world, celebrate the arts and connect Americans to their history.**

A Vital Mission

“Message Received” (March 2023) is an amazing story. What wonderful, patriotic and courageous women made up the 6888th. Thank you to all the people who brought the story the honor it deserves. It is heartwarming to see progress, finally.

Lois Rodenhuis | Dover, New Hampshire

I was filled with wonder and gratitude for the 6888th, who surely helped my father, Ray Cooke, survive World War II and even opt to remain in France for further training after the war in Europe ended. My Aunt Jean saved every letter from Ray. In 2022 I opened and read them after they had spent nearly 80 years untouched. He never failed to mention her letters and gifts from home. They meant so much to him.

Mary Cooke | Cove, Oregon

Puffin Patrol

As charming as it was to read about children up at all hours searching with flashlights for disoriented pufflings (“Make Way for Pufflings,” March 2023), I found myself asking what the townspeople are doing about their nighttime lighting, which is the cause of the pufflings’ disorientation. While the townspeople cannot by themselves alter the effects of climate change on ocean conditions, they can do something to diminish nighttime lights. That would have given me more hope about the puffins’ long-term survival.

Mary Barrett | Silver City, New Mexico

How utterly inspiring to read about this community dedicated to these baby puffins. The birds are so precious, and to see such young people—well, people of all ages—give the baby puffin an extra hand is heartwarming. It is lovely to know that this is happening generation after generation.

Beverly A. Fordham | Port Angeles, Washington

The touching puffling article glossed over the fact that, while puffin-hunting is illegal in Norway, it is still permitted in Iceland and the Faroe Islands. Even though they are cute, puffins for Icelanders also mean “food.” It is common to hunt them in Iceland and the Faroe Islands for their meat, feathers and eggs. Visitors can actually order them in many tourist restaurants in Reykjavik, usually smoked to taste almost like pastrami, or broiled in lumps resembling liver.

Phyllis Thompson | Houston

Resisting the Nazis

“The Vienna Agent” (March 2023) told the story of Muriel Gardiner, the only American woman in the Austrian Resistance. It’s also worth remembering Mildred Fish-Harnack of Milwaukee, who accomplished much in the German Resistance. An author and educator, she—along with her German husband, Arvid Harnack—was active in a resistance group known as the Circle. They both were executed in a Nazi prison. Fish-Harnack’s work is detailed in the 2021 book *All the Frequent Troubles of Our Days* by Rebecca Donner.

Bern Enright | Brookfield, Wisconsin

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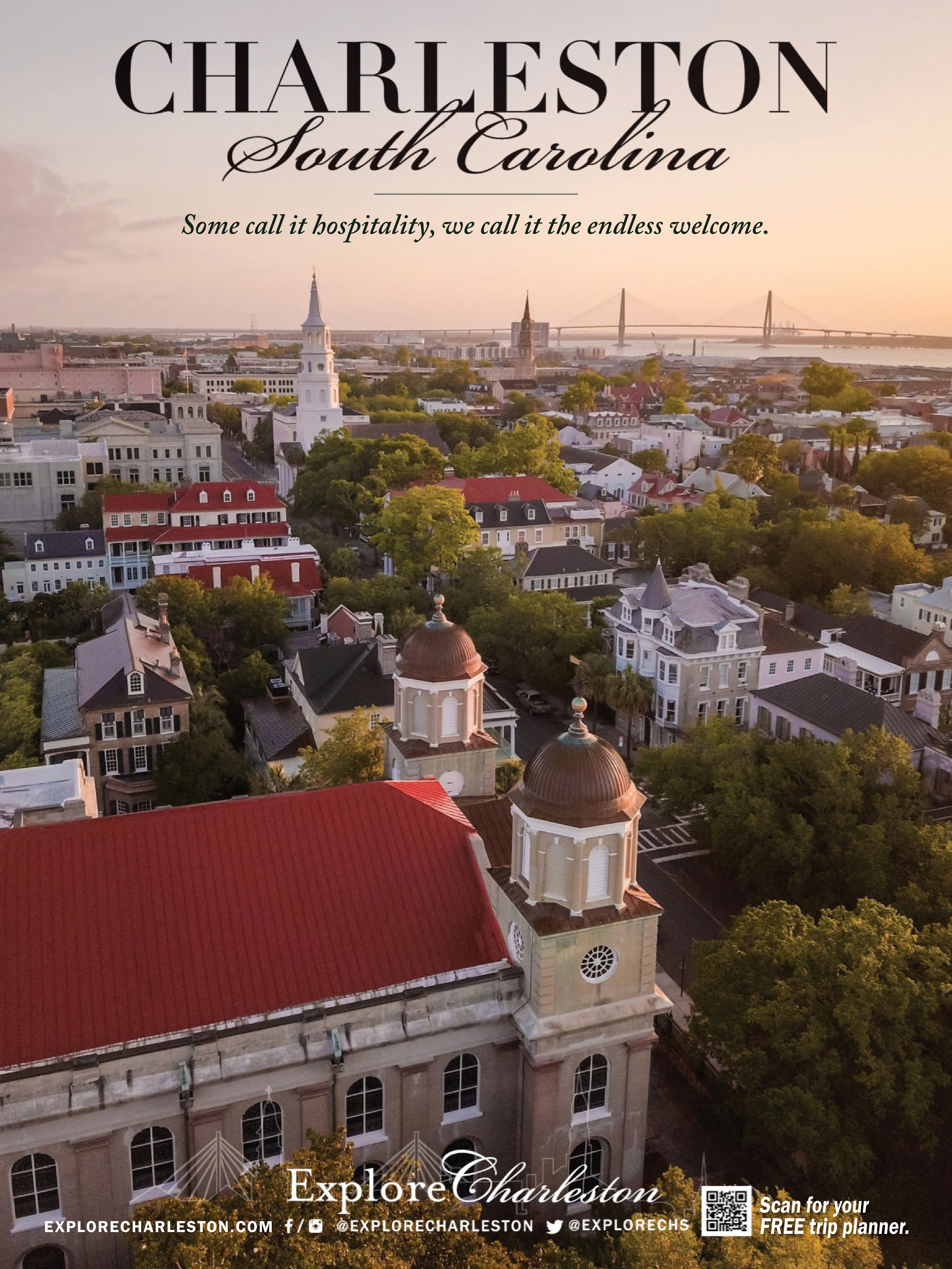
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MAGAZINE

The Power of Portraits

AN EXHIBITION AT THE NATIONAL PORTRAIT GALLERY SHOWCASES THE PHOTOGRAPHY OF BRIAN LANKER—AND THE REMARKABLE LIVES OF HIS SUBJECTS

NEARLY A DECADE before the National Museum of African American History and Culture opened, the museum's inaugural exhibition, "Let Your Motto Be Resistance," opened at the National Portrait Gallery. The exhibition examined how African American portraiture used both pose and lens as tools in the struggle for equality, and I was immensely proud that it served as the first example of the work the African American museum would go on to do.

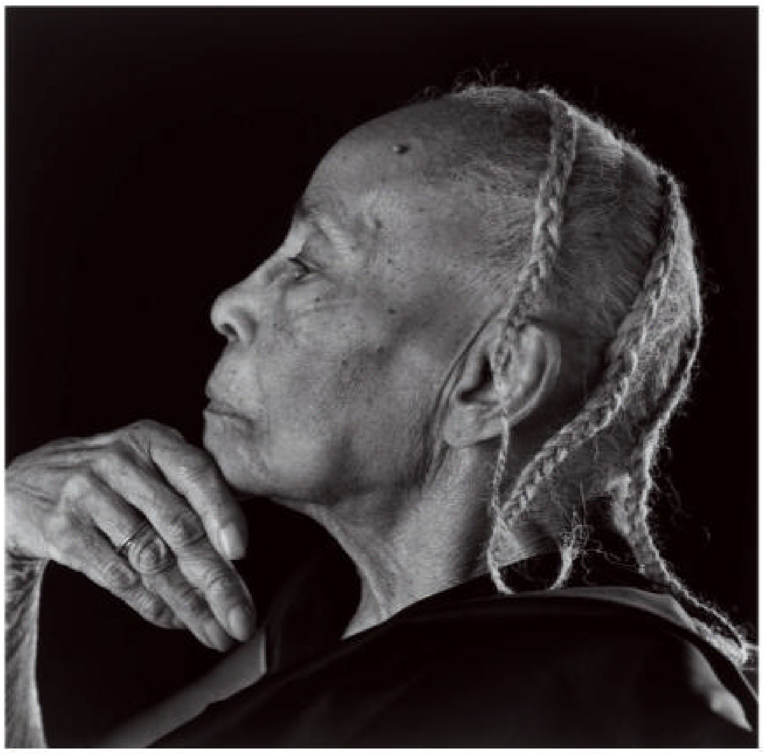
I am prouder still that this work continued across the Smithsonian: In the intervening years, the Portrait Gallery has remained committed to diversifying its collections. It has curated a range of exhibits featuring African American subjects and artists across all media—paintings, prints, photography and more—but its current exhibition "I Dream a World: Selections from Brian Lanker's Portraits of Remarkable Black Women (Part II)" is a particularly striking display.

The two-part installation showcases selections from Brian Lanker's 1989 book of the same title. Every image is unique: Lanker traveled to meet each subject in their community, interviewed them and photographed them only after establishing trust. That intimacy comes through in his work.

In the current exhibition, a few images stand out. Dorothy Height, whom President Barack Obama called "the godmother of the civil rights movement," is photographed in front of a statue of Mary McLeod Bethune, who served as her mentor and whose memorial she helped create. Myrlie Evers-Williams, who spent three decades pushing for the white supremacist who killed her husband to be brought to justice, is pictured holding the flag that once blanketed his coffin.

Septima Clark, whose portrait served as the cover of Lanker's book, is the only one whose image appears in both installations of the exhibition. A prominent grassroots activist and educator, she was involved in several pivotal moments of the civil rights movement. She is photographed in profile, to hide the side of her face that had been paralyzed by a recent stroke. She looks defiant, stoic, proud—a portrait that Lanker hoped would "give her the dignity and strength her life embodied."

"I Dream a World" is a collection of intimate portraits of activists, athletes, artists and scholars, all of whom changed the course of our history. Lanker's art is an attempt to commemorate their work with the respect and grace it warranted but rarely received. The resulting images are arresting—they inspire visitors to carry these women's stories with them long after they leave. ◆



› Photographed before her death in 1987, Septima Clark helped win African Americans the right to teach in Charleston, South Carolina.

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Portrait illustration by **Jurell Cayetano**

the scroll

A GLIMPSE AT OUR DIGITAL OFFERINGS

TOP OF THE PAGE: **BEST-SELLING BURDEN**

Author of blockbuster tale ready to close that chapter

With her first novel, *The Outsiders*, published in 1967 when she was 19, S.E. Hinton achieved a level of success that most writers never dare to dream of. Centered on Ponyboy and his "greaser" friends, who often tangle with a rival group of more privileged teens, the novel has sold more than 15 million copies and remains in print, a now classic American tale of class warfare and adolescent angst. Yet Hinton, who has written nine books, says, "I am very tired of talking about [it]. This may be the last interview on *The Outsiders*." Read what may be her final words on the matter in a *Smithsonian* exclusive at ***Smithsonianmag.com/theoutsiders***

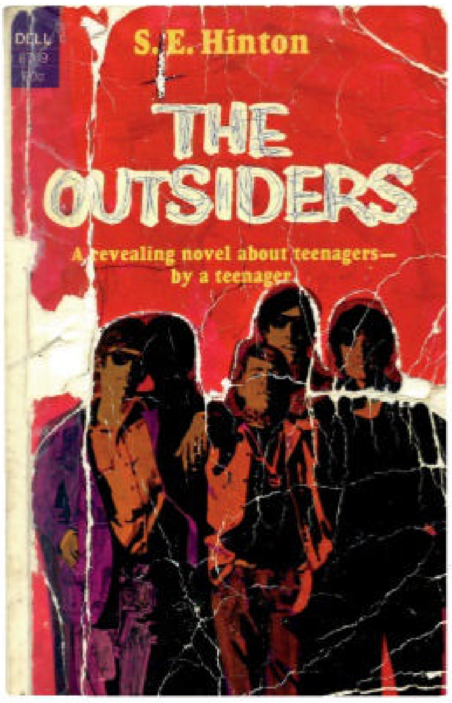


PHOTO OP: **FAMILIES**

Quality Time

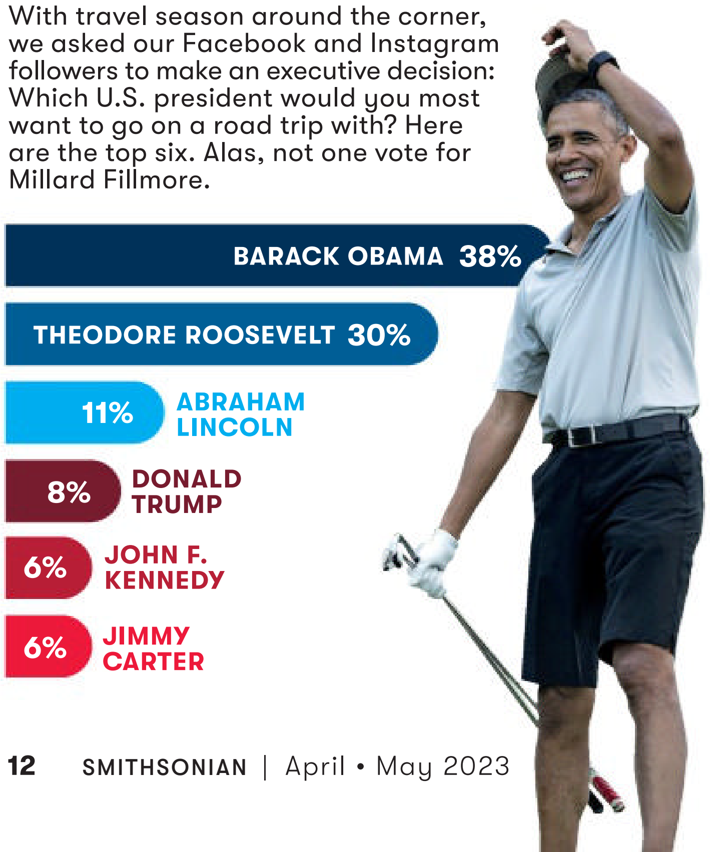
Photography by **Thomas Holton** Since 2003, Holton has documented the Lam family, originally of New York City's Chinatown, including the lives of three siblings and a friend.

For more images of modern-day families, visit the "Kinship" exhibit at the National Portrait Gallery and **Smithsonianmag.com/kinship**

FROM THE FORUMS: **ROAD TRIP!**

Passenger in Chief

With travel season around the corner, we asked our Facebook and Instagram followers to make an executive decision: Which U.S. president would you most want to go on a road trip with? Here are the top six. Alas, not one vote for Millard Fillmore.



POINT OF VIEW: **MONARCH MIGRATION**

Causing Commotion

> "Everyone thinks of butterflies as being quiet, but . . . when thousands of monarchs are in the air at once, they produce a constant whooshing sound."

Ernest H. Williams Jr., professor emeritus of biology at Hamilton College, New York

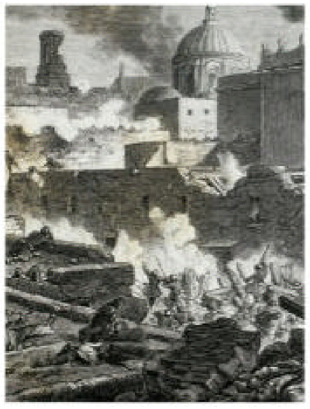
Find out more about the seasonal flight of monarchs at Smithsonianmag.com/monarchs

Events

Will you be tuning in to the coronation of King Charles III? If not, never mind. If yes, what is with all the interest in the British royal family? Just in time for the big event, the Boston University historian Arianne Chernock, an expert on the monarchy, will deliver an exclusive online lecture about **Americans' curious fascination with the Crown.** Log on to see it live on May 2 at 7 p.m. EDT. For more information and tickets, go to **Smithsonianmag.com/events**

FROM THE ARCHIVES

If you think only of tacos and margaritas when **Cinco de Mayo** comes around, think again. The day would be better marked enjoying chalupas and other dishes authentic to Puebla, site of the battle the holiday commemorates. Learn more about the city's culinary culture and the 1862 **Battle of Puebla** at **Smithsonianmag.com/puebla**



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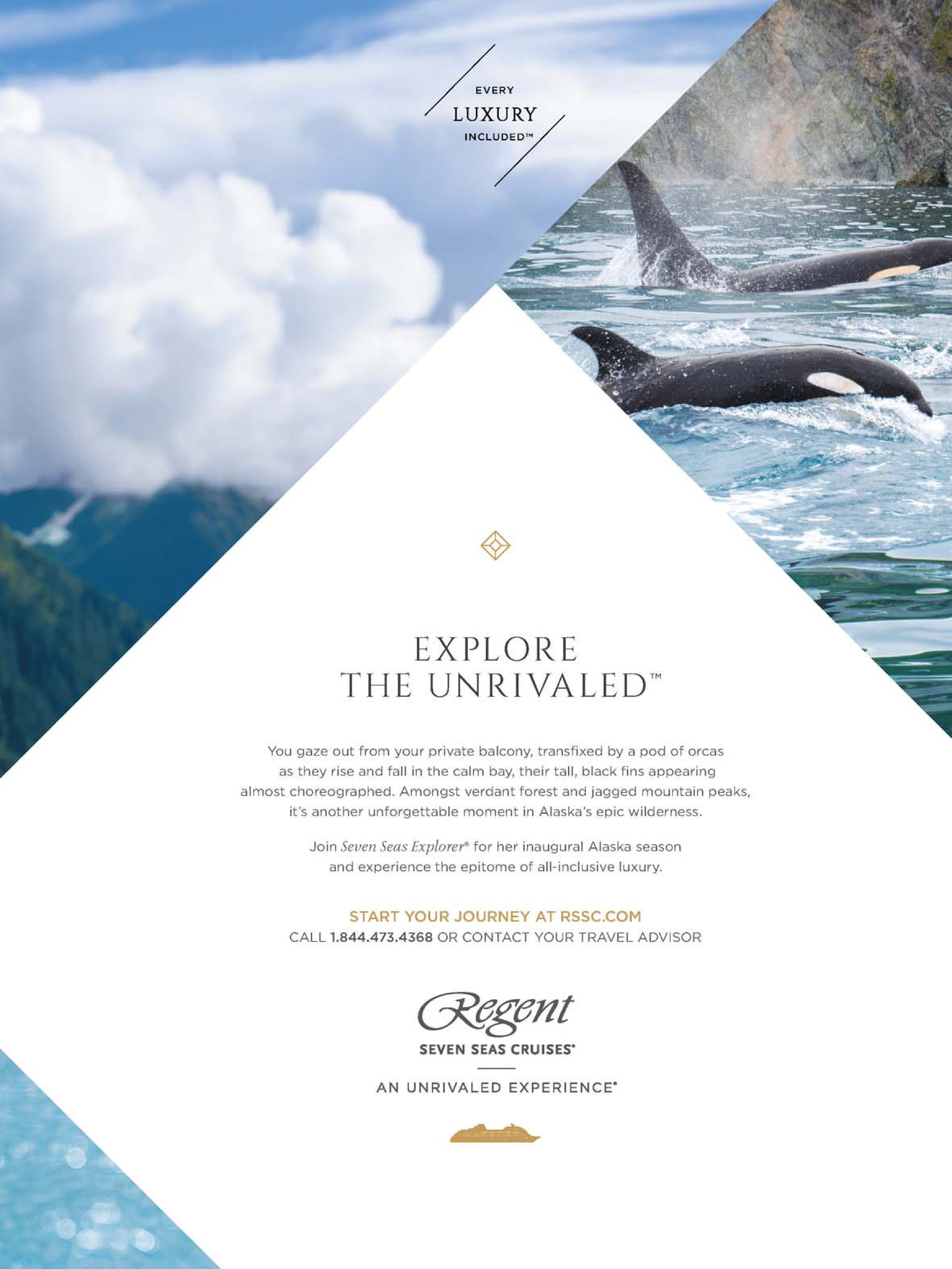

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AMERICAN ICON

By
Shannon Sims

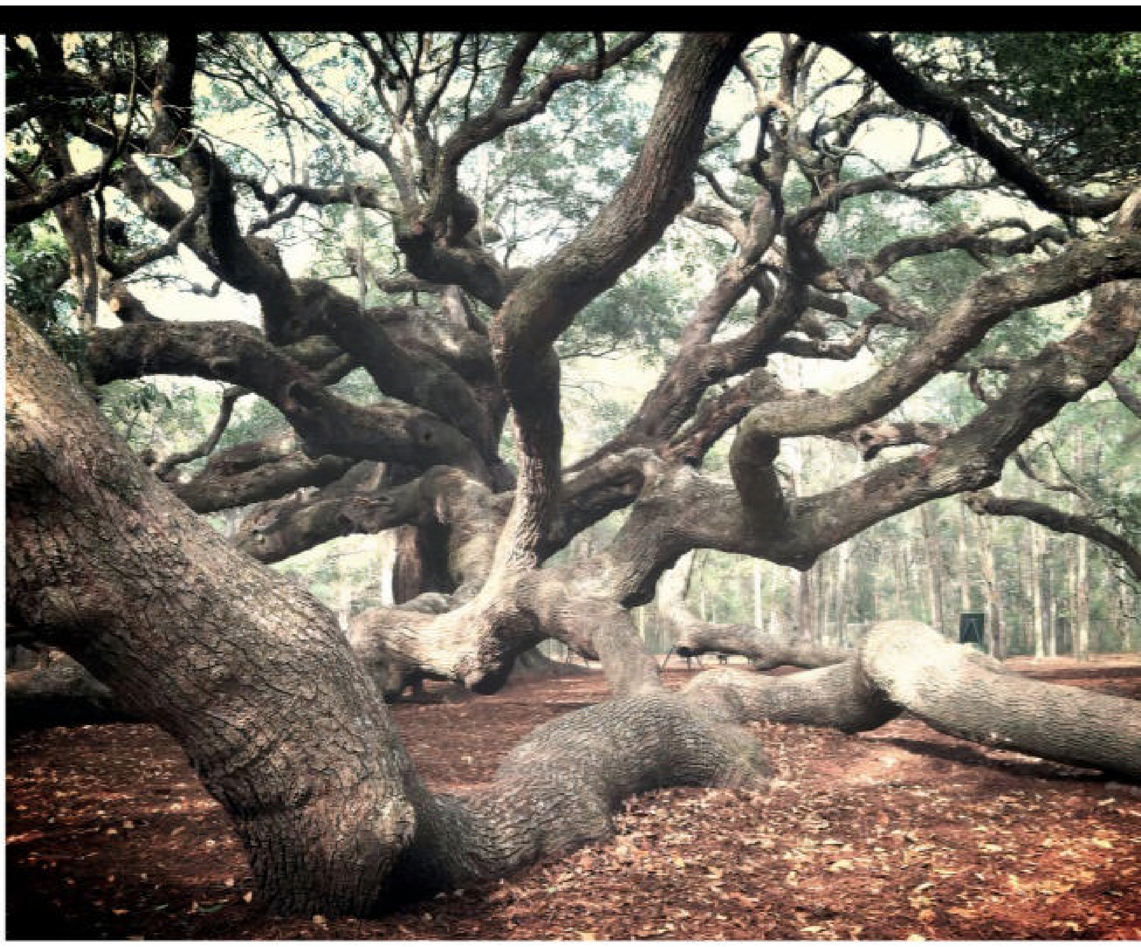
Photograph by
Lisa Elmaleh

Steadfast

Majestic and sturdy, the live oak tree has offered protection time and again

Live oaks in Beaufort, South Carolina, photographed using an old-fashioned wet-plate process.

AMERICAN ICON



The Angel Oak in South Carolina, famous for its age, is also massive—65 feet high with a trunk circumference of 25.5 feet.

I SAW IN LOUISIANA a live-oak growing / All alone stood it, and the moss hung down from the branches." —Walt Whitman, *Leaves of Grass*, 1860-61

More than 150 years after Whitman wrote those lines, the southern live oak still embodies the American ideal of individual resilience—a stoic figure standing tall. One of the country's more whimsical-looking trees, the live oak is also one of the strongest. Indeed, it has saved the lives of thousands of people who have clung to its limbs during hurricanes. And these days scientists appreciate its extraordinary capacity for absorbing atmospheric carbon, a bonus in the era of climate change. However solitary the live oak might appear, the species is working hard to ensure our collective survival.

Native to the United States, *Quercus virginiana* is known for its longevity—the trees can live for over a thousand years—and for its signature limbs, with their sinuous, gangly quirkiness. Southern live oaks get their name because, unlike oaks that lose their leaves in the winter, live oaks regrow their foliage throughout the year, so their leaves are unfailingly lush, adorning the Southeast from Virginia down the East Coast and through the South to Texas and Oklahoma, with low-hanging branches that seem to beckon climbers.

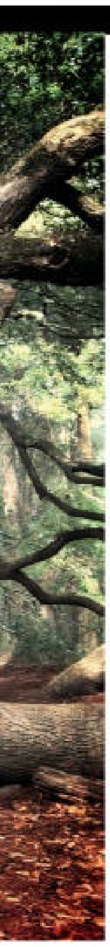
These rugged trees tend to grow inland from coastal dunes and are considered the longtime keystone species of the maritime forests of the American South because they offer crucial support to a remarkably diverse host of species. Their famously deep and hardy roots, meanwhile, give live oaks impressive staying power.

The live oak has nourished and protected the continent's inhabitants for many centuries. Beginning in pre-Columbian America, Native peoples have ground the tree's acorns into meal and knew its strong roots could be counted on during disasters. In the late 1700s, the U.S. Navy recognized the tree's toughness—and its curved limbs, ideal for ship hulls—and began using it to make particularly sturdy vessels: The world's oldest ship still afloat, the USS *Constitution*, launched in 1797, got its nickname, "Old Ironsides," during the War of 1812 after its hull, made in part of live oak, proved itself equal to the fearsome cannons of the British. The physician and poet Oliver Wendell Holmes Sr. called this impregnable vessel the "eagle of the sea"—a floating proxy for America itself.

> “IT'S ALMOST A SPIRITUAL EXPERIENCE, TO STAND UNDERNEATH THESE INCREDIBLE TREES.”

The tree's fortitude has become even more important in the era of climate change, and the live oak still represents a life raft for those in the paths of tropical storms. Resistant to salt water, the trees serve as a defense against extreme weather, with deep roots that hold fast and downward-curling branches that offer shelter from high winds. "While the dunes and barrier islands are effective at mitigating storm surges and high winds, the next round of defense is this maritime forest," explains Paul Manos, a professor of biology at Duke University, who has studied oaks for most of his career. "Live oaks are not very tall but very broad, and they are biomechanically adept at handling high winds because the winds go right over them." Equally important, the live oak is thought

TOP LEFT: LAUREN MCDANIEL; MINDEN PICTURES; ALAMY (2); MERLINTUTTLE.ORG / SCIENCE PHOTO LIBRARY



to be one of the most efficient trees in the world at capturing carbon because of its large canopy, dense wood and impressive longevity, which is why Douglas Tallamy, an entomologist and wildlife ecologist at the University of Delaware, sees oaks as an important part of long-term solutions to climate change.

Live oaks' survival skills are on vivid display if you drive through southwest Louisiana to the Gulf of Mexico. You won't see many structures near the end of the road; fences, businesses and homes have been demolished by a series of storms over the past decade. But you will see big, beautiful oak trees, centuries old. So many people over the generations have ridden out storms here by holding fast to the branches of a live oak. Historians have traced this practice to a Native trapper in the 1800s who taught settlers how to tie themselves to these "storm trees" during hurricanes. There are still locals who tell me they rode out a catastrophic 1957 storm that way.

One of the greatest threats facing the live oak is development. "I get calls every day," says Coleen Perilloux Landry, chairman of the Live Oak Society, an organization of the Louisiana Garden Club Federation. "Most of the time they call panic-stricken at the last second because the utility company is in their yard about to cut down the branches." Landry typically sends an arborist to the site to learn if it is necessary to fell the tree, or to make sure the company cuts only what is needed.

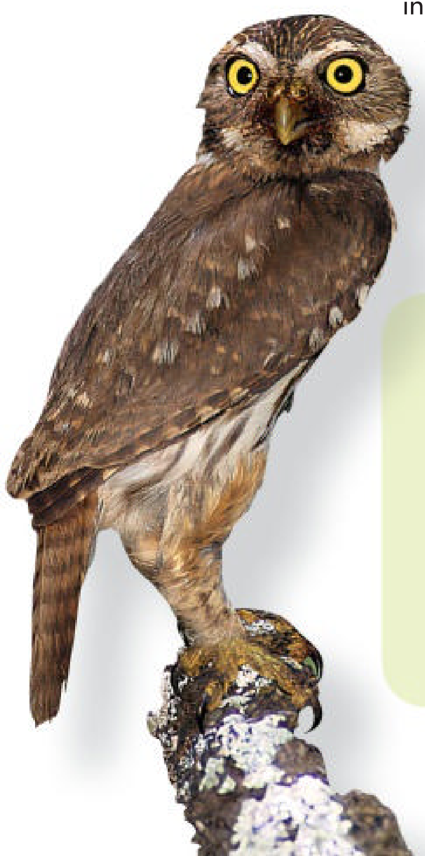
The current president of the Live Oak Society is 1,200 years old. One of the vice presidents has a trunk more than ten feet in diameter. Landry is the society's only human member; the rest are the trees. One of the most famous is Angel Oak, a titan 400 or more years old on Johns Island in South Carolina. A low-country tourist attraction because of its majestic beauty, it is protected from developers. Across the South, other anonymous live oaks lack protections—though anyone can register a given tree for conservation; that way, the society knows to intervene if it's threatened.

Whitman, of course, found his arboreal muse in Louisiana, and while there are live oaks at the National Arboretum in Washington, D.C., "We don't have anything like the Angel Oak," says horticulturist Kevin Conrad. "To see the real deal, you have to go south. . . . It's almost a spiritual experience, to stand underneath these incredible trees."◆

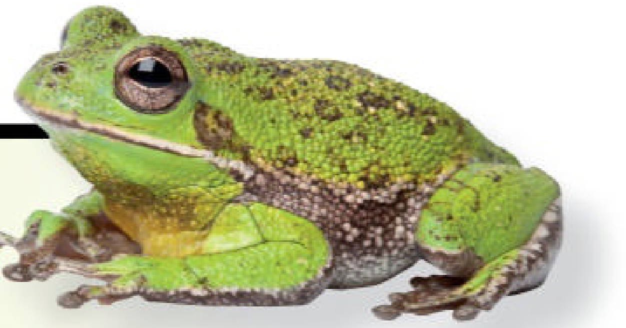
Support System

AS A KEYSTONE SPECIES, THE SOUTHERN LIVE OAK SHELTERS HUNDREDS OF WOODLAND CREATURES. MEET FOUR

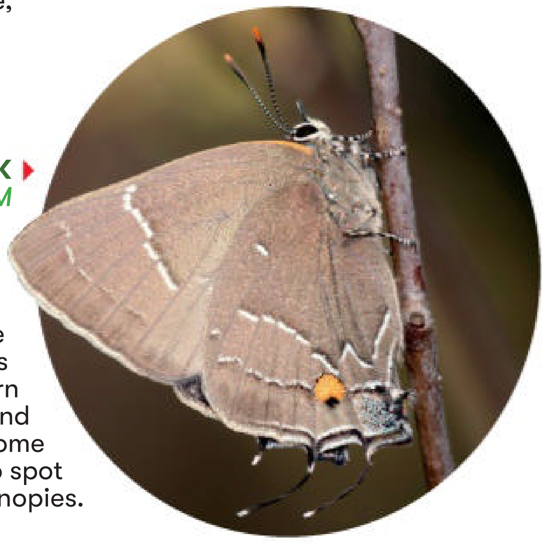
By **Rebecca Worby**



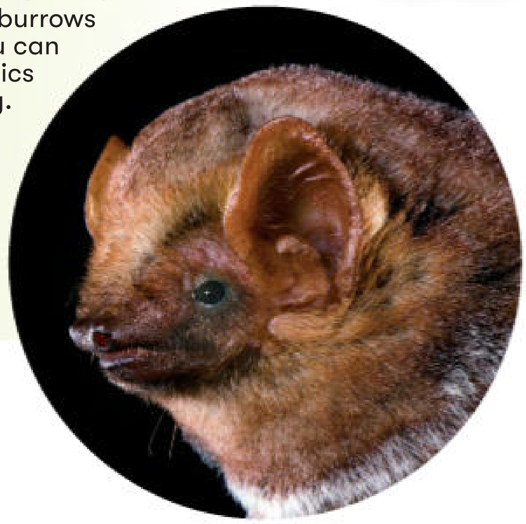
FERRUGINOUS PYGMY OWL
GLAUCIDIUM BRASILIANUM
These tiny, long-tailed owls are well known in parts of Mexico and Central and South America, but their range extends into Arizona and south Texas, too. In Texas, the birds' survival mainly depends on the live oak, says Fred Bryant, director of development at the Caesar Kleberg Wildlife Research Institute in Kingsville, Texas. The owls often like to make their nests in the cavities that woodpeckers have left in the trees.



BARKING TREE FROG
HYLA GRATIOSA
Named for its jarring call, the largest native tree frog in the U.S.—typically 2 to 2.75 inches long—spends the warm months in the branches of live oaks and burrows beneath the roots in winter. You can see these frogs doing acrobatics as they hop toward the canopy. Indeed, in 1961 the late Doris Cochran, a Smithsonian herpetologist, observed that, in captivity, they can "easily perform on a toy trapeze" thanks to the strong suction of their fingers and toes.



WHITE M HAIRSTREAK
PARRHASIUS M-ALBUM
This butterfly takes its name from its wings, which are blue on top, with silvery undersides sporting a zigzagging white line that resembles an "M" and, to some observers, a false eye. In the American South, caterpillars lay their eggs on the leaves of southern live oaks; farther north, they depend on other oak species. Once they become butterflies, though, they are hard to spot because they live so high in the canopies.



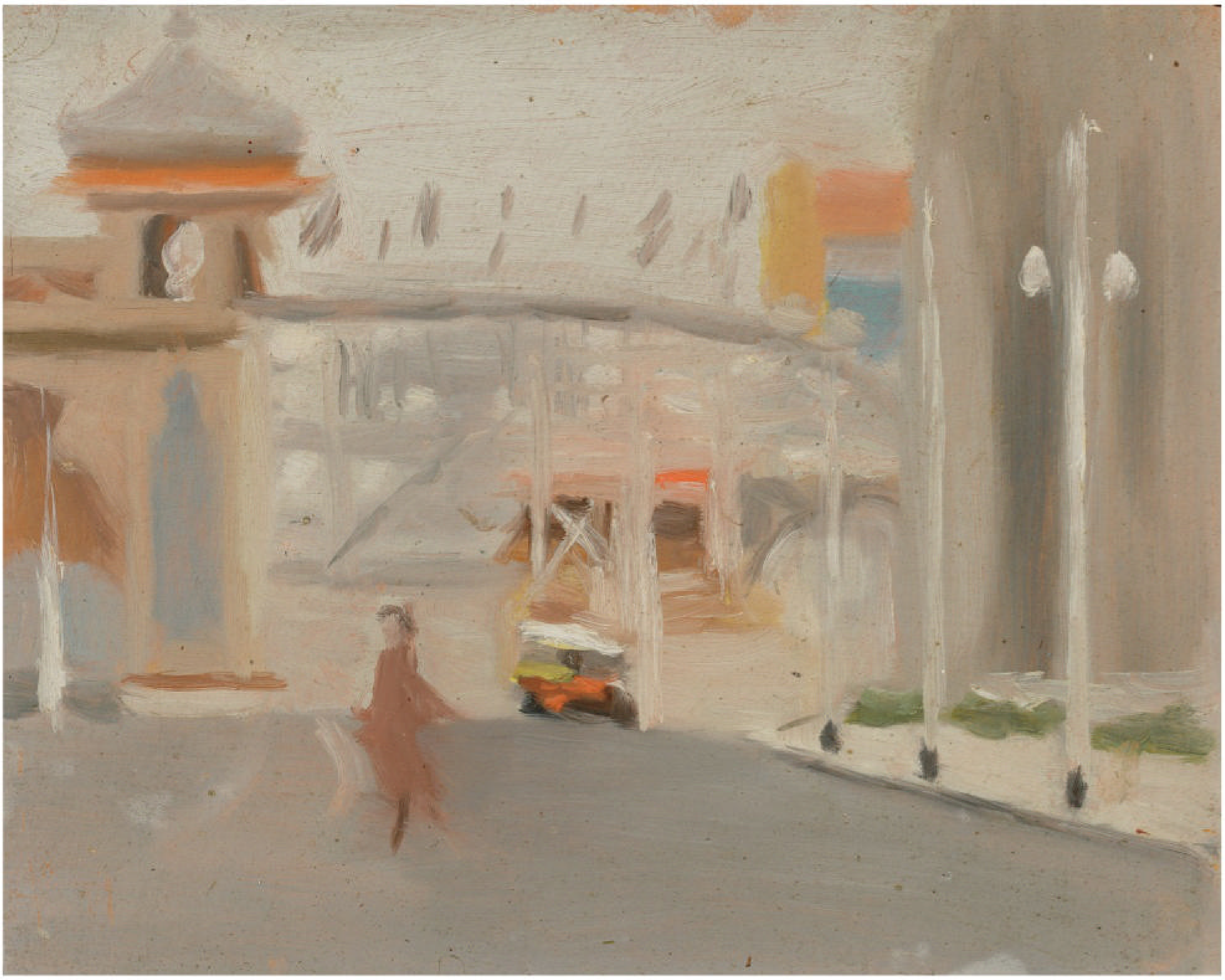
SEMINOLE BAT
LASIURUS SEMINOLUS
This reddish-brown bat likes to roost in clumps of Spanish moss that thrive on live oak branches. These solitary, big-eared creatures especially enjoy the shady mats of Spanish moss on the southwest sides of oaks, where they huddle and snooze during the day. These areas are generally free of branches, giving the bats a clear flight path.

ART

By
Amy Crawford

OUT OF THE MIST

Shining a light on the great Australian modernist the world almost never knew



ART GALLERY OF SOUTH AUSTRALIA, GIFT OF ALASTAIR HUNTER OAM AND THE LATE TOM HUNTER IN MEMORY OF ELIZABETH THROUGH THE ART GALLERY OF SOUTH AUSTRALIA FOUNDATION 2019

Clarice Beckett painted *Luna Park* (1919) across the street from a Melbourne amusement park. "Her eye alighted on fleeting moments," says gallery director Jason Smith.

C**LARICE BECKETT** spent most of her adult life caring for her parents, who disapproved of her artistic ambition. But in the soft light of early morning and evening, Beckett roamed Melbourne with an easel, aiming, she wrote, "to give as nearly as possible an exact illusion of reality." After she died of pneumonia in 1935 at age 48, her father burned many of her canvases. The rest were stored in a shed, where weather—and possums—destroyed all but a few hundred. In the late 1960s, Beckett's sister brought those to the attention of a Melbourne curator, who exhibited them at her gallery; today she is one of Australia's most beloved artists. A major retrospective of her work opens this month at the Geelong Gallery in Geelong, Victoria. Beckett was a modernist who painted deceptively complex pictures, says Jason Smith, the gallery's director, but to many compatriots their appeal is straightforward. "When we look at her sunsets . . . roads and telegraph poles, and her images of the city, they are recognizably Australian landscapes." ◆

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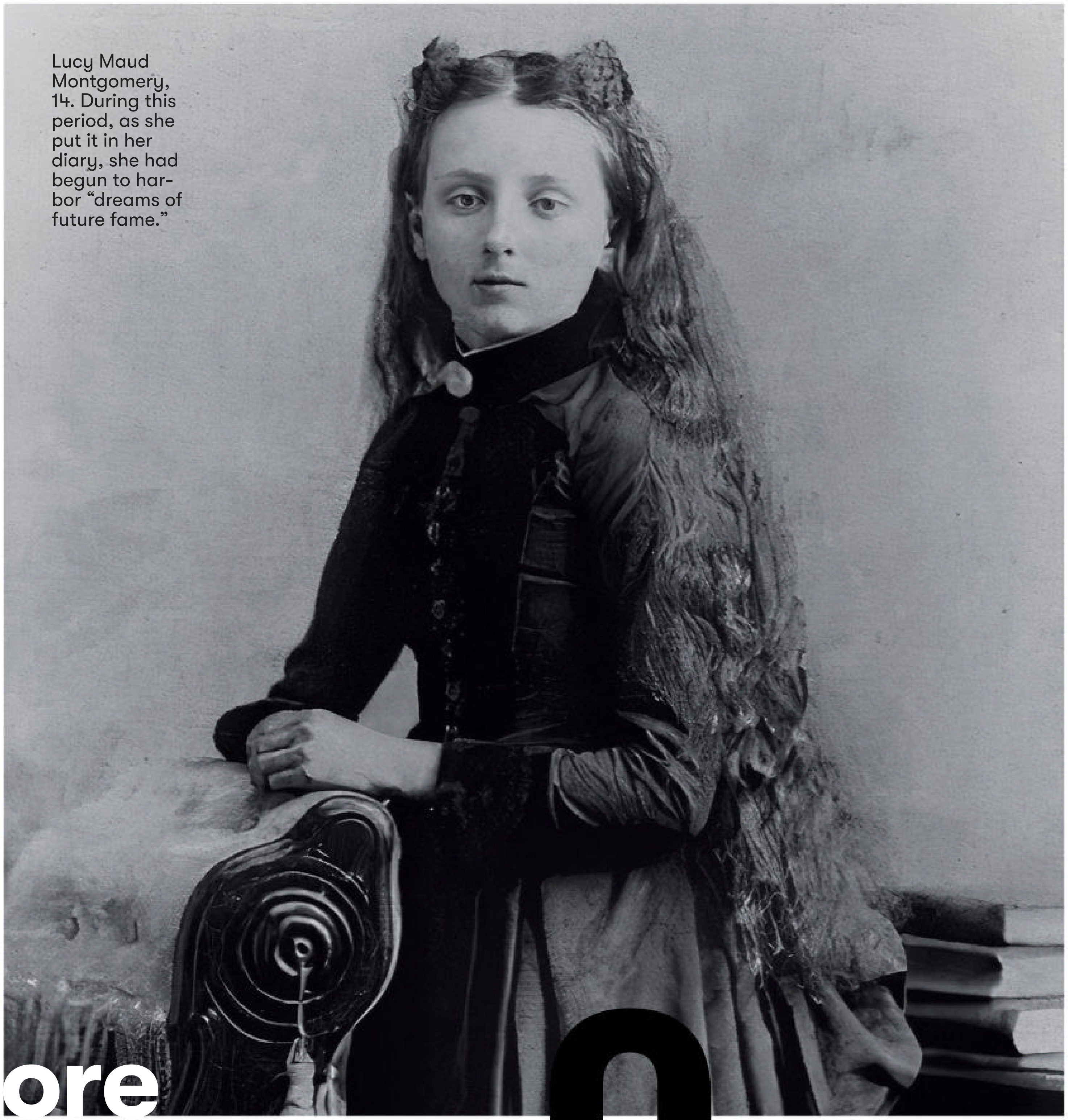
LITERATURE

by
Vanessa Braganza



Lucy Maud Montgomery, 14. During this period, as she put it in her diary, she had begun to harbor “dreams of future fame.”

COURTESY UNIVERSITY OF GUELPH

More Than Anne

The life of L.M. Montgomery was less charmed than her most beloved heroine might have you believe

ON A WARM, GOLDEN DAY in early August, I sat by the lake in the area of Park Corner on Prince Edward Island, where Lucy Maud Montgomery, author of the beloved 1908 children’s novel *Anne of Green Gables*, spent her childhood summers. Sunlight glittered on the water; a soft breeze played among the reeds and feathery grasses. The view from my picnic blanket inspired stories and settings that have enraptured readers worldwide for more than a century. Montgomery’s tale of the imaginative orphan Anne Shirley captured the minds of so many people that she and her red-headed heroine quickly became global literary sensations. ➔

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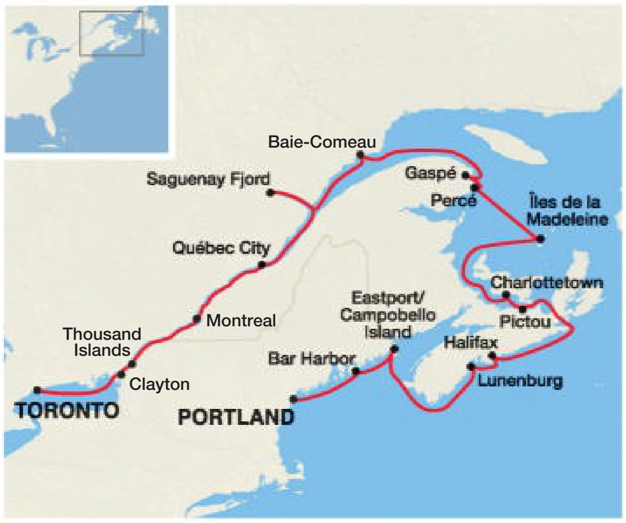
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At the Green Gables Museum, visitors can see photos of Montgomery's nemesis, Aunt Emily, with her husband and children, photographed at their New Moon homestead.

In the palpable enchantment that lingers over the Park Corner house, originally the home of the novelist's Aunt Annie and Uncle John Campbell, Montgomery found a haven to give her imagination free rein. She later called the house "the wonder castle of my childhood." It is now the Anne of Green Gables Museum, owned by George Campbell and managed by Pamela Campbell; the two siblings are great-grandchildren of Annie and John Campbell.

Today, of course, Montgomery's name is nearly inseparable from *Anne of Green Gables*, and many fans think of her and Anne as the same person. But by the author's own account, readers have been wrong for more than a century.

"People were never right in saying I was 'Anne,'" she told a fellow writer, Ephraim Weber, in a 1921 letter, "but, *in some respects*, they will be right if they write me down as *Emily*." She was referring to *Emily of New Moon*, a later novel, the first in a series about the difficulty of making it as a young female writer.

I had come to Park Corner to walk in Montgomery's footsteps and see the world from which she spun stories that blended fantasy and reality. Yet her fiction, synonymous with bright, idyllic settings and bubbly heroines, also had a darker side—and the picturesque beauty of Park Corner felt at odds with the sober vibe of *Emily* (1923), her bleakest and most serious book.

"You should go to New Moon," Pamela Campbell said when I confessed my interest in the lesser-known *Emily*. The house, she said, "is just down the road."

ON FEBRUARY 15, 1922, at her home in Ontario, Canada, Montgomery set her pen down in triumph.

"Today I finished *Emily of New Moon*, after six months writing," she announced in her journal. "It is the best book I have ever written—and I have had more intense pleasure in writing it than any of the others—not even excepting *Green Gables*. I have lived it, and I hated to pen the last line and write *finis*."

A century after its 1923 publication, *Emily* is powerful and disquieting, a view into the author's sometimes embattled life. The novel and its two sequels tell the story of Emily Starr, a young girl who weathers prejudices and challenges to achieve her dream of becoming a published author.

Emily, like Anne, is an orphan, but there the resemblance ends. Anne finds not only a home, but "kindred spirits" who fall under the spell of her gift for seeing beauty and possibility in the world. In the *Anne* novels, the emotional complexity of Montgomery's art lies in the way that adult characters who are hardened in some way—the stern Marilla, Anne's adoptive mother, or the rigid widow Aunt Josephine Barry—become more compassionate human beings under Anne's influence. Montgomery's perceptive insights into such relations became her trademark.

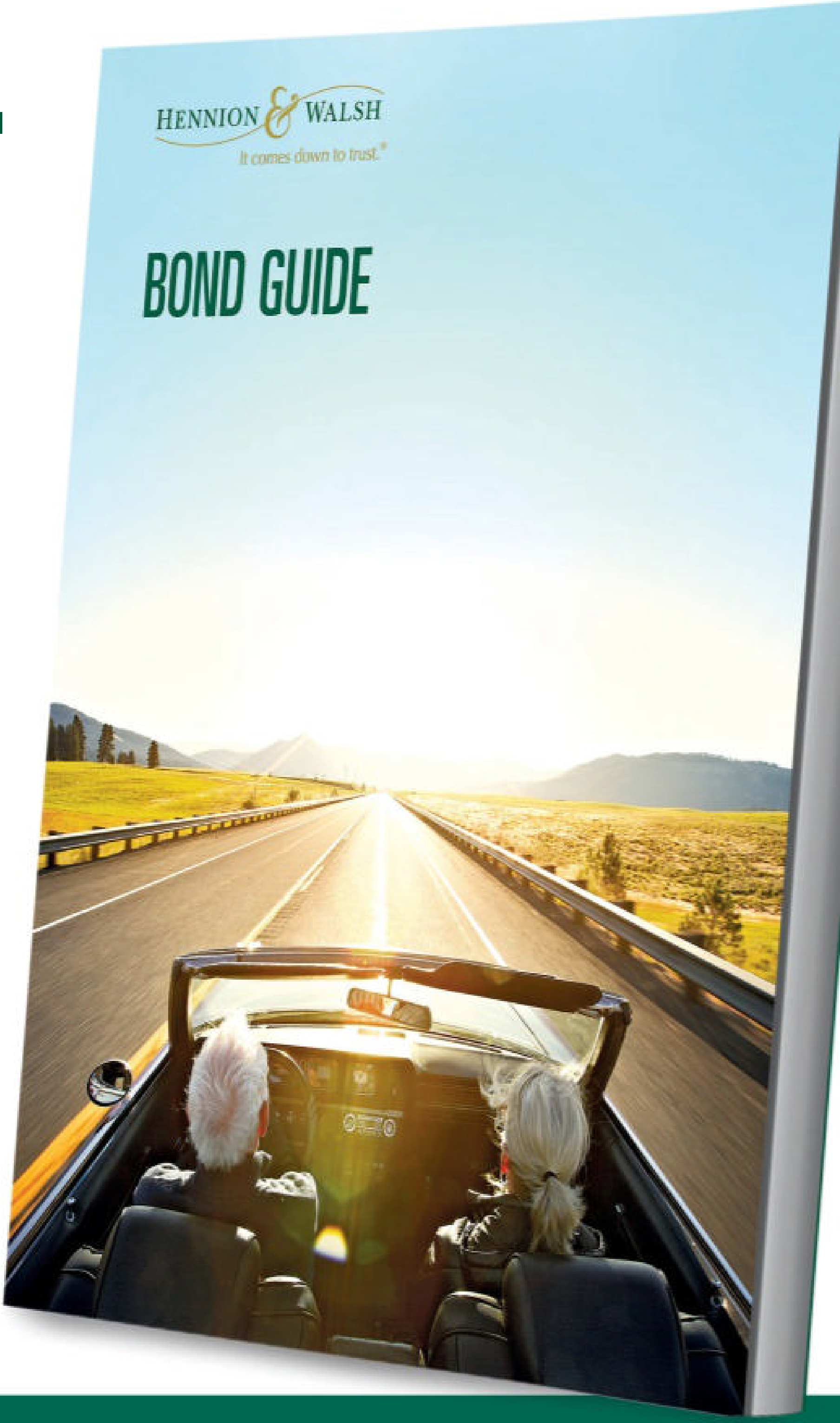
Montgomery in 1908, the year she published *Anne of Green Gables*.

In *Emily*, though, generational relations play out differently. After her father dies, Emily is adopted by her dead mother's family, the Murrays of New Moon, and finds herself at the mercy of her strict Aunt Elizabeth, who forbids her from reading or writing stories. Emily finds it "maddening that nobody could see that she *had* to write." She is obsessed with words—their sound, their music and the magic of finding the right ones, which sparks a thrill of inspiration that she calls "the flash." Aunt

BYLINES

Vanessa Braganza is a writer and literary scholar based in Cambridge, Massachusetts.

COURTESY V.M. BRAGANZA; COURTESY CANADA.CA



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"Then whisper, blossom, in thy sleep
How I may upward climb
The Alpine path, so hard so steep
That leads to heights sublime;
How I may reach that far-off goal
Of true and honoured fame
And write upon its
A woman's humble name.
— L.M. Montgomery
KING EDWARD MUSIC READER
GEOGRAPHY

Montgomery taught at the Lower Bedeque School on Prince Edward Island for six months beginning in 1897. Restored in the 1980s, the school is now a museum dedicated to Montgomery, with period items that evoke student life.

COURTESY V.M. BRAGANZA (3)

Elizabeth's harshness is calculated to clip the wings of Emily's imagination.

"No Murray of New Moon had ever been guilty of writing 'stories,'" the narrator of *Emily* tells us. "It was an alien growth that must be pruned off ruthlessly. Aunt Elizabeth applied the pruning shears; and found no pliant, snippable root but that same underlying streak of granite."

Like the novels of Louisa May Alcott or Mary Wollstonecraft, *Emily* made the (then-revolutionary) point that young women's literary ambitions deserved to be taken seriously. Emily's "granite" stubbornness emboldens her to find ways of defying her aunt's ban on words, from spending her egg money on paper to scribbling poems on old "letter-bills"—government-issued records of the mail delivered to post offices.

"Aunt Elizabeth is very cold and hawty," Emily writes in a diary. When Aunt Elizabeth insists on reading her private writing, Emily burns the diary, mentally adding to the entry in her mind, "and she is *not fair*."

To some extent, Montgomery did base the Anne and Emily characters on herself, even inserting passages from her diaries wholesale into the novels. But while *Anne* was a charmed story, *Emily* was in many respects closer to the author's reality. After her mother died in 1876, Montgomery's father left his infant daughter in the care of her maternal grandparents in Cavendish, Prince Edward Island. The elderly couple were a far cry from Marilla and Matthew, the brother and sister who adopt Anne. The young Maud's willful, imaginative personality frequently clashed with her grandparents' strict conservatism.

> **TODAY I FINISHED WRITING *EMILY OF NEW MOON*. I HAVE LIVED IT, AND I HATED TO PEN THE LAST LINE AND WRITE *FINIS*.**

LEARN ABOUT *a new digital archive of the author's poems, stories and journalism at* ***Smithsonianmag.com/montgomery***

"Grandfather Macneill, in all the years I knew him, was a stern, domineering, irritable man," Montgomery wrote in her own diary in 1905. "Grandmother was kind to me 'in her own way,'" she continued. "Her 'way' was very often torture to me and I was constantly reproached with ingratitude and wickedness."

Another adult who played a formative role in Montgomery's childhood was her maternal aunt, Emily Macneill Montgomery, who babysat young Maud before marrying and moving to a new homestead—a house in Malpeque called New Moon.

But Aunt Emily is not, as her name might suggest, Montgomery's inspiration for the heroine in *New Moon*. In fact, she probably inspired quite a different character: the "hawty" Aunt Elizabeth.

"As for Aunt Emily," Montgomery wrote in the same 1905 diary entry, "I have never cared for her. She jars on me in every fibre; she has no intellectual qualities; she is unsympathetic, fault-finding, nagging and 'touchy.' I can never forgive her for the sneers and slurs she used to call upon my childish ambitions and my childish faults." These lines describe the fictional Aunt Elizabeth to a T.

By the time Montgomery began writing *Emily*, in August 1921, she had already shot to international fame. But the road to renown had been fraught. In her 1917 memoir, *The Alpine Path*, Montgomery recalled a poem that she had clipped from a women's magazine as a child and pasted into her writing portfolio for inspiration. Echoing her own ambi-

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tions, the poem's speaker wondered,

How I may reach the far-off goal
Of true and honored fame,
And write upon its shining scroll
A woman's humble name?

The question is a poignant reminder of the obstacles early 20th-century women writers faced—even those who, like Montgomery, defied the norms that curtailed the aspirations of many women. During this era, Canadian law often did not recognize women as "persons," barring them from participating in political life and sharply limiting their financial independence.

Aunt Emily's animus toward her niece's achievements became family lore. Pamela Campbell recalls stories her mother told her: On one occasion, Aunt Emily began to read one of Montgomery's books but threw it down in disgust.

"There was [another] book [Montgomery] wrote called *A Tangled Web*," Campbell adds, "and Emily started to read it and said, 'I'm ashamed I know her!' and shut the book."

The source of Aunt Emily's antagonism toward Montgomery remains unclear. Campbell recalls, "My mother thought maybe there was resentment. Maybe Aunt Emily saw herself in the book." To this day, Montgomery's descendants report a family rumor that Aunt Emily herself longed to be a writer, so perhaps what she "saw" in *Emily* was a version of her own disappointed hopes and dreams. Poignantly, Montgomery's colossal achievements came at the price of ostracism and censure from members of her own family.

I DROVE UNTIL the road met the ocean. At last, I spotted the house from behind. There seemed to be a shadow over it. Perched high atop the red cliffside, stark and flanked by firs, New Moon would only be fully visible from the ocean, so I waded out into Malpeque Bay. As the chilly wavelets crept up my ankles and I turned back to face the house, I felt a surge of gratitude toward the author who had climbed the "Alpine Path," whose stories had defined my own childhood and inspired me to become a writer. A century after Emily's release, she has not only inscribed "a woman's humble name" on readers' hearts: Her vision has shaped a future in which readers like me could dare to imagine and to write. ◆

L.Mモンゴメリ
赤毛のアン
村岡花子譯

Novel Readership

WHY JAPANESE READERS BECAME SOME OF MONTGOMERY'S MOST DEVOTED ADMIRERS

By **Brandon Tensley**

WHILE *ANNE OF GREEN GABLES* was translated into more than 36 languages, perhaps its most ardent fan club emerged in the 1950s in Japan.

Shortly before the outbreak of World War II, the Japanese writer and translator Hanako Muraoka (below) was given a copy of the book in English by a Canadian friend. Working at night and in secret—Muraoka feared that being caught with a book from an enemy nation might mean prison—she lovingly translated the novel. Her version was finally published in Japan in 1952, under the title *Akage no An* ("Red-Haired Anne") and became a best seller. (A first edition is pictured above.) It began entering school curricula that same decade, and in the 1990s, a theme park in the Hokkaido prefecture unveiled a replica of the Green Gables house.

Why did Anne become such a sensation in Japan?

"Earlier readers of *Akage no An*, in the 1950s and '60s, strongly identified with the orphan Anne's difficult situations, as the war produced more than 120,000 orphans," says Yuka Kajihara, an L.M. Montgomery researcher who works at a library in Toronto. "Japanese readers must have welcomed Anne's determination and optimistic nature and the model she represented for young Japanese women, and some men, on how to build themselves new lives and futures amid the chaos of postwar Japan."

Terry Dawes, a writer who grew up on Prince Edward Island and has researched Anne's Japanese fandom for years, adds that Shinto, Japan's ancient national faith, might play a role. The novels feature "long passages where [Anne] is just communing with nature," Dawes says. "She has a kind of spiritual connection with things like the water, the rocks, the soil, the sky. I think that for people raised under Shintoism, that [connection] makes sense."

Anne's popularity among Japanese readers persists today. If you hop on an airplane to Prince Edward Island, Dawes says, you've got a good chance of being seated beside a Japanese mother and daughter, on their way to explore the place where Anne's story was created. ◆

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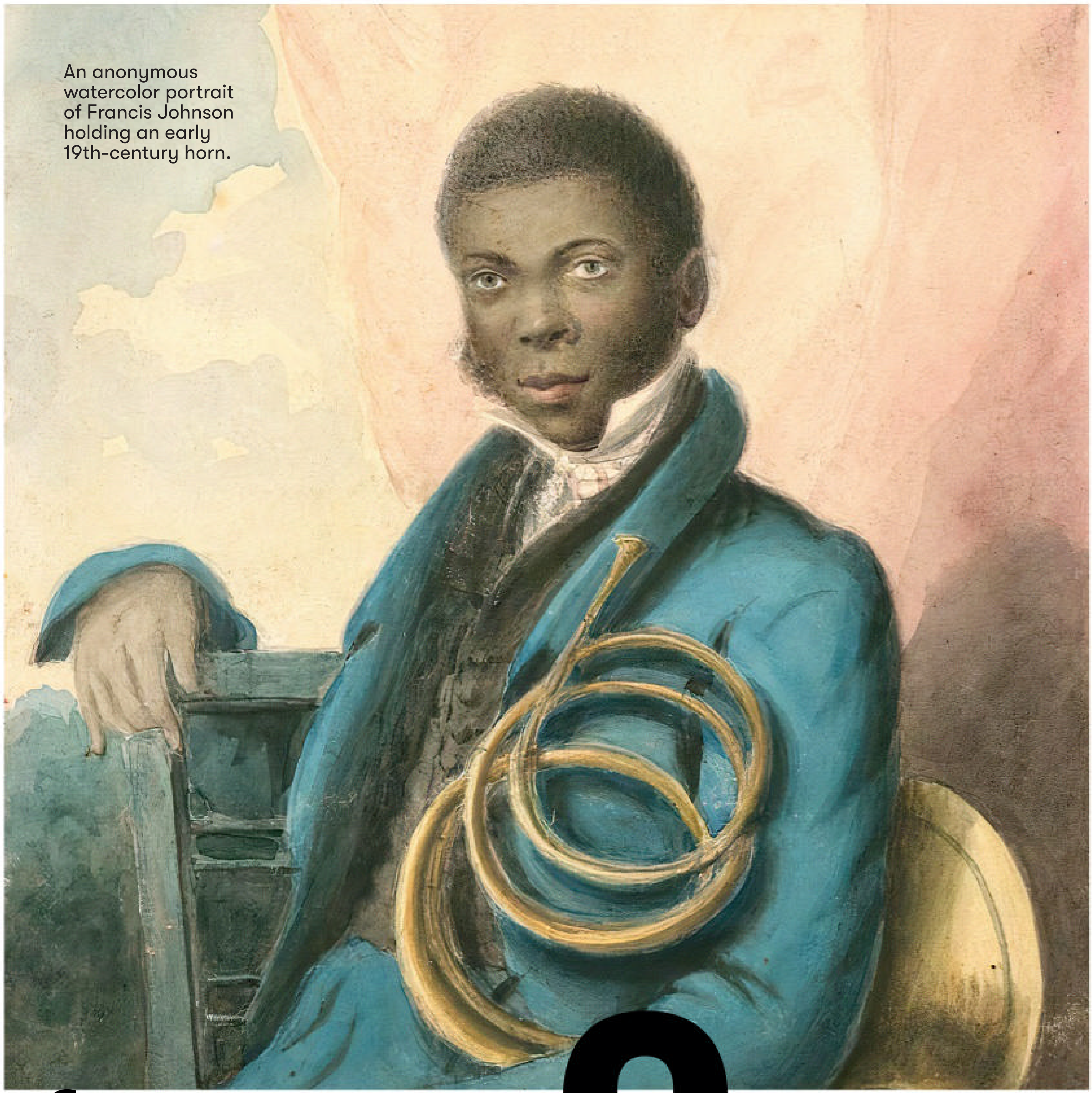

An anonymous watercolor portrait of Francis Johnson holding an early 19th-century horn.

Before There Was Jazz

The innovations of a forgotten genius who laid the groundwork for America's signature music

ON MARCH 9, 1819, a supremely gifted musician named Francis "Frank" Johnson played a concert at the Masonic Hall on Chestnut Street in Philadelphia. Johnson and his bandmates were free Black men; the audience was white and well-to-do. The building was a monumental Gothic Revival masterpiece with a towering steeple.

Johnson, a 26-year-old composer and multi-instrumentalist, was already a sensation in Philadelphia. A book about the city published that year described him as the "leader of the band at all balls" and "inventor-general of cotillions," a dance craze that was overtaking the city. The author, Robert Waln, a former U.S. representative from Pennsylvania, also ➜

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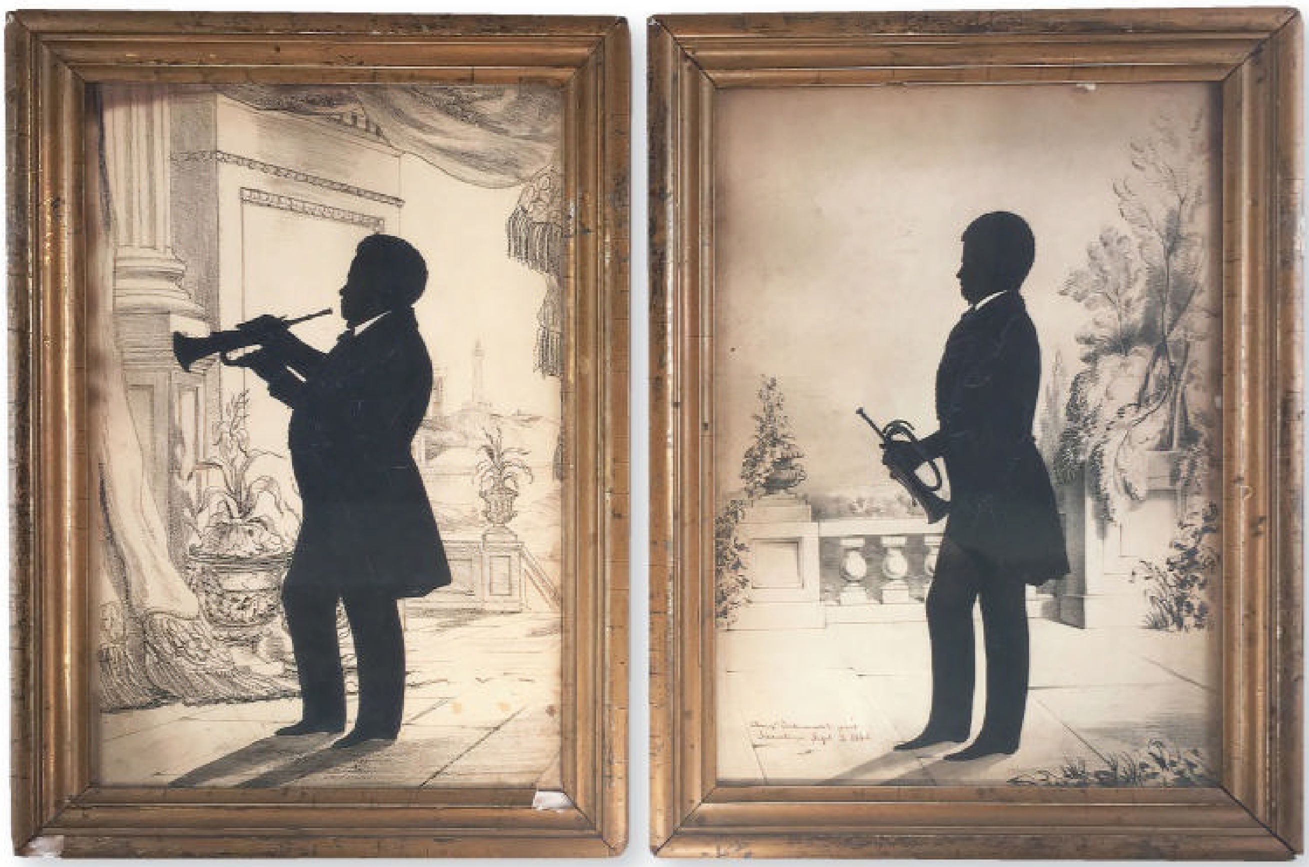
marveled at Johnson's flair for reinventing a sentimental song into an irresistible, foot-stomping jig or reel.

At some point during the show, the hall caught fire. The flames climbed up through the walls, and the mighty steeple collapsed, though no one was hurt or killed. And while the fire was started by a newly installed gas jet mounted too close to a flammable curtain, many Philadelphians enjoyed speculating that Frank Johnson's "hot music" had ignited the blaze.

"Hotness" is a quality often associated with ragtime and jazz—Louis Armstrong's first bands in the 1920s were called the Hot Five and Hot Seven—and it derives from making the rhythm more propulsive while stretching out certain notes. Was Johnson playing an early prototype of jazz, a century before its recognized birth in New Orleans?



Silhouettes by the French portraitist Auguste Edouart show Johnson, right, and his mentee Joseph G. Anderson, who led Johnson's band after the great man's death.

Experts are divided on that question, but all agree that Johnson was a major figure in early American music. Renowned for his inventive compositions and his virtuosity on wind and string instruments as well as the pianoforte, he broke through racial barriers, becoming the first Black musician to have his sheet music published, run a training school for other Black musicians and tour widely in the United States. And in 1837, he was the first Black American musician to take a band to Europe, where some historians say he played for Queen Victoria.

"THERE'S ONE HUMAN RACE, AND MUSIC IS THE THING THAT BRINGS US TOGETHER."

Johnson was famous all over the United States, as well as in Canada and Great Britain, but he was almost completely forgotten during the 20th century. Now, his star is rising again as musicians dust off Johnson's compositions in an effort to bring his dazzling music back into the culture.

Rodney Marsalis, from the illustrious New Orleans jazz family, first heard about Johnson upon moving to Philadelphia in 2006 and "just fell down the rabbit hole with this guy." As Marsalis learned, Johnson had more than 200 compositions published, including cotillions, quadrilles, waltzes, reels, operatic airs, military marches and quicksteps. Marsalis, a trumpeter, was particularly struck by the composer's ability to appeal across racial lines: Johnson was the first Black musician to perform in integrated concerts with white musicians. "That really drew me to him," Marsalis says. "He believed there's one human race and music is the thing that brings us together. That's why it's so important to bring him back to life."

Little is known about Johnson's early years. It is often stated without evidence that he was born on the Caribbean island of Martinique. More persuasive is a baptismal certificate from St. Paul's Episcopal Church in Philadelphia for a Francis Johnson, born June 16, 1792. The church was in the Society Hill neighborhood, where Johnson lived as a teenager and adult in a free Black community, whose members were welcomed by the white rectors at St. Paul's.

By his 15th birthday, having mastered the flute, piccolo, violin, bugle and pianoforte, Johnson was playing in Philadelphia taverns and was soon hired as a fiddler at a predominantly white social venue called the Exchange Coffee House in an old mansion on Third Street, where he built up a huge following. His fans delighted at the breadth of his repertoire and his highly danceable revamps of older songs. In 1810, when Johnson was 18, George Willig, a Philadelphia-based music publisher, heard him play at the coffee house and asked him to write some original music. The result was "Bingham's

BYLINES

Richard Grant's most recent book is *The Deepest South of All: True Stories from Natchez, Mississippi.*

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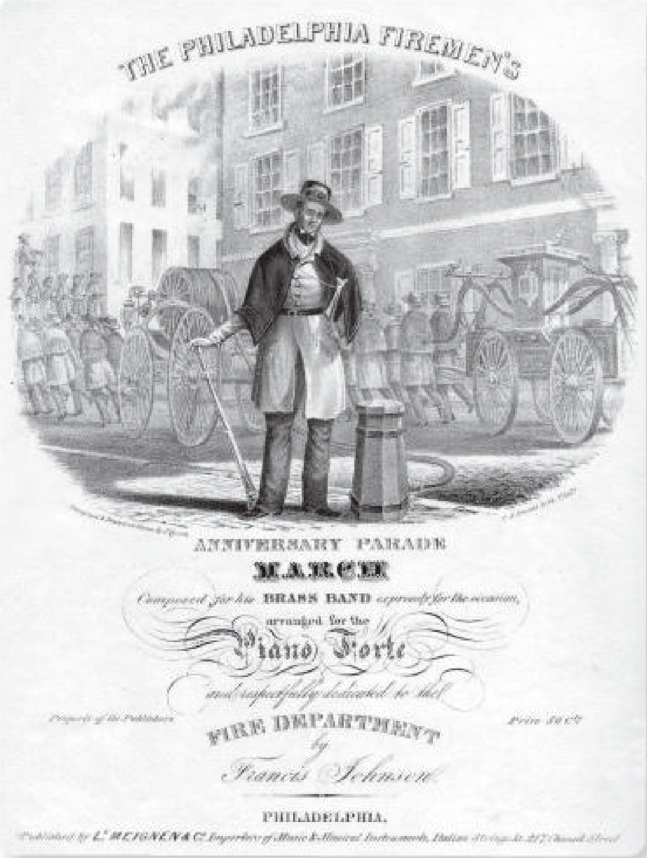
Cotillion," a piece named after William Bingham, the former owner of the coffee house building. It was the first musical composition published by a Black American. That same year, a new instrument called the keyed bugle arrived in Philadelphia. It was tough to play, with finger-operated levers that opened and closed the tone holes, but it afforded much greater possibilities for musical expression.

The cover for the sheet music for a parade march composed by Francis Johnson and dedicated to the Philadelphia Fire Department, c. 1842.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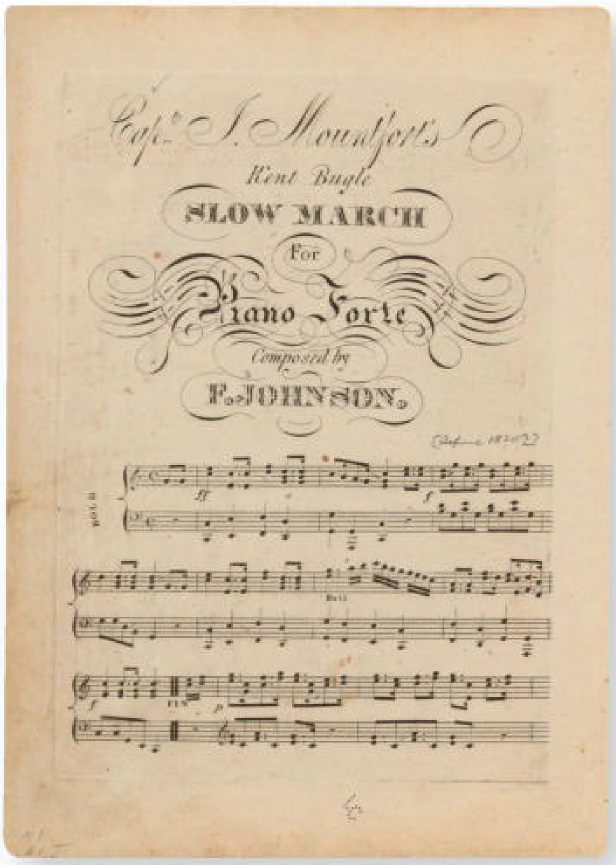


The opening bars of "Captain J. Mountfort's Kent Bugle Slow March," composed by Johnson and published 1823-1824.

After several years of practice, Johnson was the nation's foremost master of the keyed bugle and developed a technique of singing through the horn while playing it. When he performed his composition "Philadelphia Fireman's Quadrille," audiences were astonished to hear his bugle cry out, "Fire!" He could also impersonate an ice cream vendor hawking his wares and use his flute to mimic a canary.

Johnson explored all the musical forms of his day, including Mozart's concertos, Irish jigs and Black sacred music. He wrote a series of works in the Spanish-Andalusian style, composed military marches and led a military band of free Black musicians.

One of Johnson's most ardent admirers today is Homer Jackson, a visual artist who heads the nonprofit Philadelphia Jazz Project and has used public spaces to stage pop-up concerts of Johnson's work. "When you look at the pictures of Frank Johnson, he looks so beautifully composed. Supremely confident," Jackson says. "He reminds me of Miles Davis that way."

Jackson does see Johnson's music as a precursor of jazz. "He definitely wasn't composing jazz, but the notes on the page are not the whole story," he says. "When he performed, people described his playing as inventive, with embellishments, distortions and soul-stirring energy. When we performed his pieces, it was so easy to see how you could 'get happy' with that music, in the African American way, and make it swing."

In 1819, Johnson married Helen Appo, a Society Hill seamstress who became a successful costumer, milliner and tailor. It appears the couple had no children. When he wasn't playing military or society events—or practicing or composing—he would give lessons in their house. One student recalled that Johnson's music room was filled with instruments, with thousands of compositions on the shelves and, in one corner, "an armed composing chair, with pen and inkhorn ready, and some gallopades and waltzes half finished."

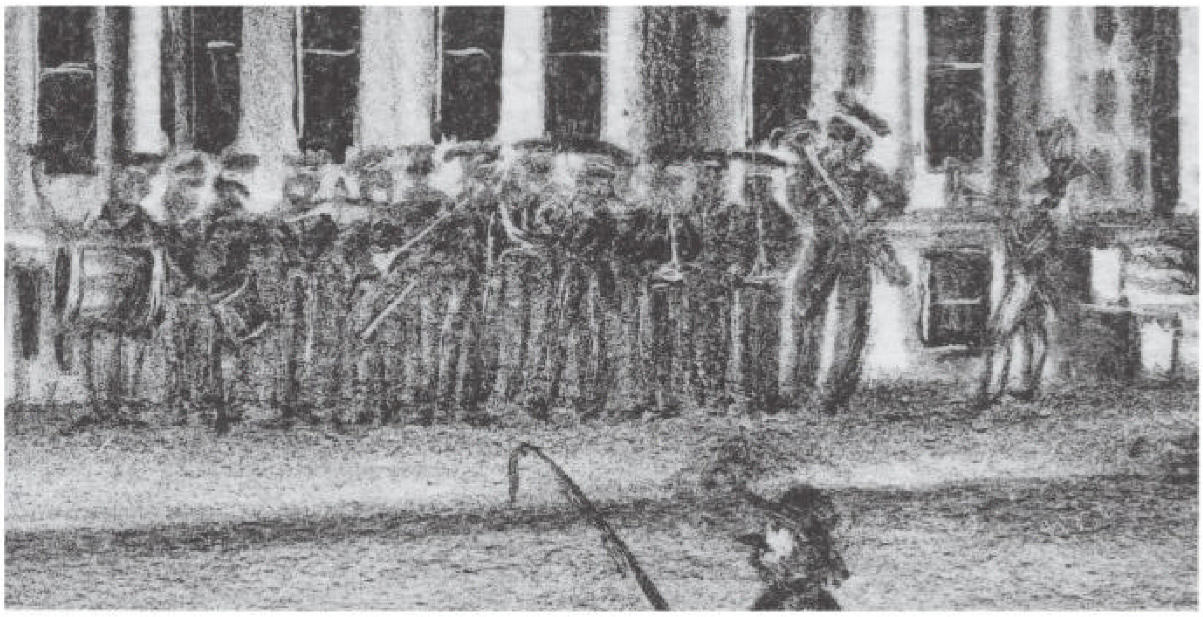
To expand his musical knowledge—and, no doubt, to seek adventure—Johnson decided to go to Europe. In November 1837, after a series of fundraising concerts in Philadelphia, the four-piece Francis Johnson Band sailed to Liverpool, England. No one had any idea how Europeans would respond to Black American musicians. When they got to London, Johnson rented a performance space at the Argyll Rooms on Regent Street and announced a series of twice-daily concerts in the newspapers: "Great Novelty . . . First time in Europe of the self-taught men of Color." To intensely curious crowds, they played selections from Rossini, Mozart and Bellini, along with Johnson's original compositions and his new arrangement of "God Save the Queen." One attendee said the band was equal to the best musicians in Europe.

> **"HIS TALENTS AS A MUSICIAN RENDERED HIM FAMOUS ALL OVER THE UNION."**

AFTER A STINT IN PARIS and a summit with Austrian composer Johann Strauss in London, Johnson returned to the U.S. His homecoming concerts, held at the Philadelphia Museum in the Christmas week ➔

LIBRARY OF CONGRESS (2)

of 1838, were a smash, drawing crowds of 3,500 people for several evenings in a row, with many more turned away at the door. He was a beloved, celebrated figure in Philadelphia, in high demand for white society events, but Johnson wanted to break new boundaries and see new sights. In 1842 and 1843, Johnson and nine Black band members embarked on the longest tour undertaken by any American musicians in the early to mid-19th century, and it turned him into a national celebrity. They traveled on riverboats and stagecoaches, and drew record crowds and rapturous reviews in New York, Ohio, Indiana, Illinois, Missouri, Kentucky, Virginia and Pennsylvania. They also clashed intermittently with the forces of white supremacy.



This detail from a lithographed sheet music cover is the only known image of Johnson's band; Johnson is believed to be the rightmost figure, with horn aloft.

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In St. Louis in December 1842, they were served with warrants and charged with being "Free Negros within the State of Missouri without a license." A local firemen's association, which had hired Johnson's band to perform at its anniversary ball, engaged a lawyer to defend the musicians, who played sold-out concerts every night as motions and appeals were filed in court. When the circuit court adjourned for its Christmas break without reaching a verdict, the band departed for Kentucky and Ohio. In Allegheny City, Pennsylvania, they faced racist violence. A mob assembled outside the concert venue and attacked the band members in the streets, hurling stones, brickbats, rotten eggs and racial epithets. Several musicians were badly hurt, but the band showed its mettle by playing the second night of its engagement.

Returning home to Philadelphia, Johnson resumed his normal schedule of playing, composing and teaching until late March 1844, when he fell desperately ill. Two weeks later, on April 6, he died at 51 from a ruptured aortic aneurysm. His funeral drew one of the largest crowds of mourners ever seen in Philadelphia, and his band played a dirge that Johnson had composed 12 years earlier. William Henry Fry, a composer, music critic and editor of Philadelphia's *Public Ledger* newspaper, delivered the eulogy. "His talents as a musician rendered him famous all over the Union, and in that portion of Europe which he had visited, while his kindness of heart and gentleness of demeanor endeared him to his own people, and caused him to be universally respected in this country."

Johnson's slide into obscurity was not immediate. Twenty years after his death, a historian named Louis Madeira noted Johnson's "very considerable celebrity" and mastery of the keyed bugle. In 1884, in a history of Philadelphia, Thomas Scharf and Thompson Westcott similarly highlighted Johnson's fame and importance to American music. But then, according to Johnson's biographer, Charles K. Jones, "all 19th-century references to him were quietly swept from the pages of 20th-century editions of standard music history books for more than six decades." In the early 1960s, Richard J. Wolfe, a musicologist, rediscovered Johnson's story while researching his three-volume *Secular Music in America*. Still, among the general public, Johnson remained about as obscure as ever.

Today, though, the Philadelphia-based movement to restore Johnson's reputation proceeds apace. Rodney Marsalis is performing entire concerts of Johnson's music with his brass band, and the Library Company of Philadelphia staged a recent exhibition about Johnson; Brian Farrow, a musician and historian, has been performing some of the great composer's music. And Homer Jackson is planning further tributes—not just to Johnson but also to the free Black musicians whom Johnson schooled in his style of playing. Asked how folks should remember Johnson today, Jackson says, "As a tributary of jazz and an American superstar." ◆

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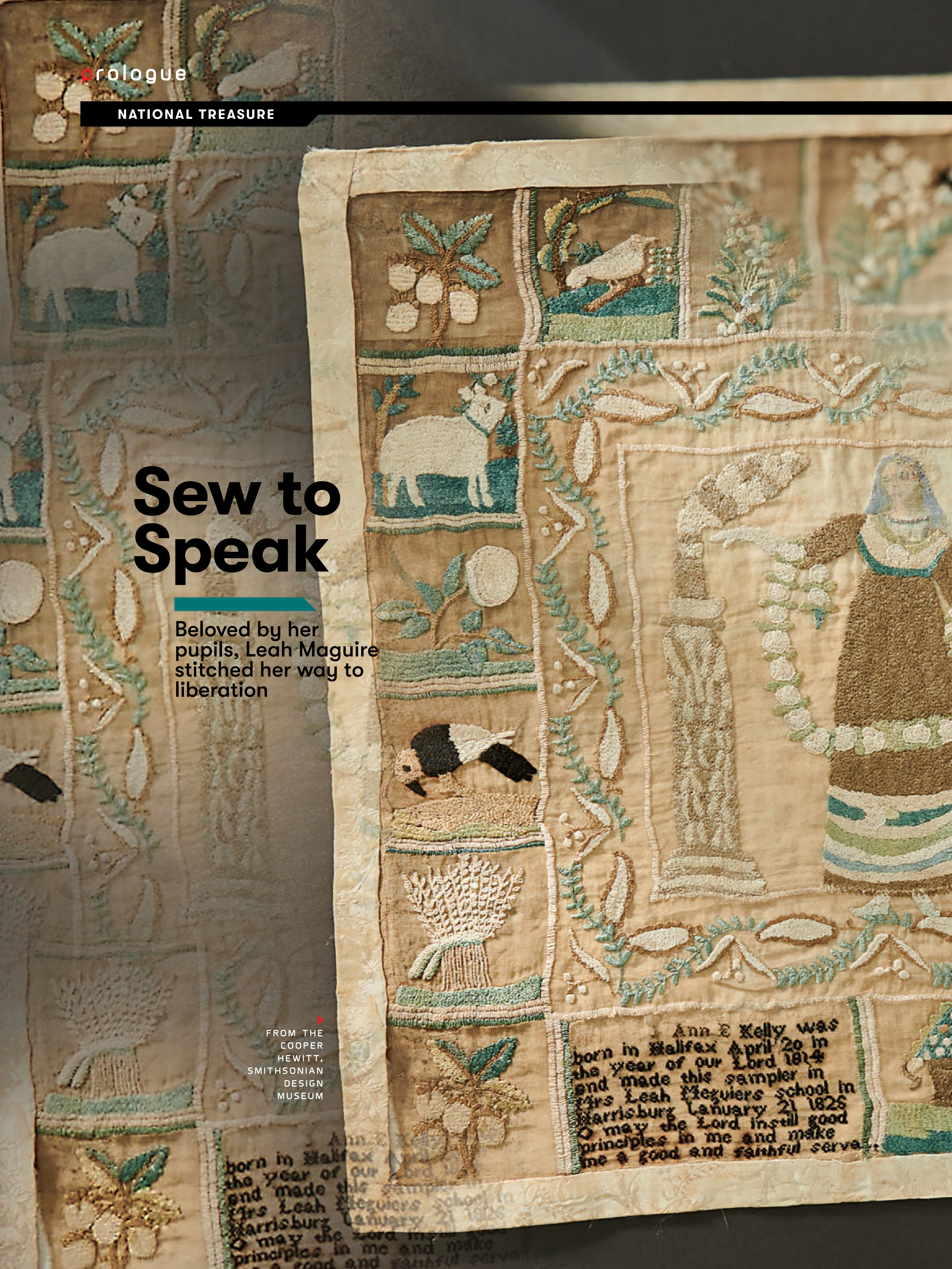
Ann E Kelly was
born in Halifax April 20 in
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and made this sampler in
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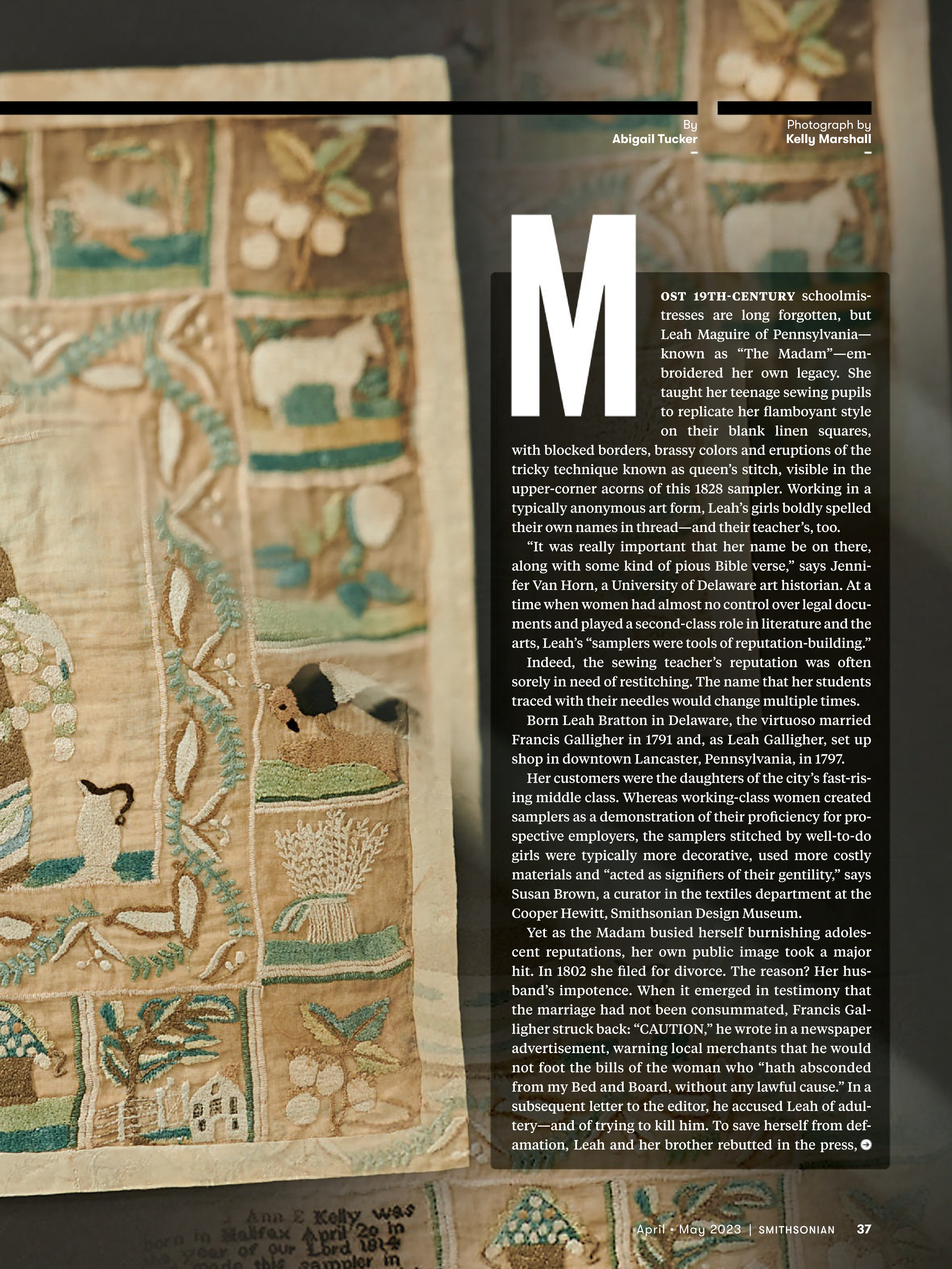


MOST 19TH-CENTURY schoolmistresses are long forgotten, but Leah Maguire of Pennsylvania—known as "The Madam"—embroidered her own legacy. She taught her teenage sewing pupils to replicate her flamboyant style on their blank linen squares, with blocked borders, brassy colors and eruptions of the tricky technique known as queen's stitch, visible in the upper-corner acorns of this 1828 sampler. Working in a typically anonymous art form, Leah's girls boldly spelled their own names in thread—and their teacher's, too.

"It was really important that her name be on there, along with some kind of pious Bible verse," says Jennifer Van Horn, a University of Delaware art historian. At a time when women had almost no control over legal documents and played a second-class role in literature and the arts, Leah's "samplers were tools of reputation-building."

Indeed, the sewing teacher's reputation was often sorely in need of restitching. The name that her students traced with their needles would change multiple times.

Born Leah Bratton in Delaware, the virtuoso married Francis Galligher in 1791 and, as Leah Galligher, set up shop in downtown Lancaster, Pennsylvania, in 1797.

Her customers were the daughters of the city's fast-rising middle class. Whereas working-class women created samplers as a demonstration of their proficiency for prospective employers, the samplers stitched by well-to-do girls were typically more decorative, used more costly materials and "acted as signifiers of their gentility," says Susan Brown, a curator in the textiles department at the Cooper Hewitt, Smithsonian Design Museum.

Yet as the Madam busied herself burnishing adolescent reputations, her own public image took a major hit. In 1802 she filed for divorce. The reason? Her husband's impotence. When it emerged in testimony that the marriage had not been consummated, Francis Galligher struck back: "CAUTION," he wrote in a newspaper advertisement, warning local merchants that he would not foot the bills of the woman who "hath absconded from my Bed and Board, without any lawful cause." In a subsequent letter to the editor, he accused Leah of adultery—and of trying to kill him. To save herself from defamation, Leah and her brother rebutted in the press, saying she'd been a "much injured woman" and denouncing Francis' "long-continued UNMANLY deception."

What the parents of Leah's pupils made of these developments is unclear, but Van Horn writes that "an atmosphere of spectacle and gossip" descended on the school. Perhaps that's why two samplers from 1802 appear without her tarnished moniker.

The next year, though, her restored maiden name, Bratton, graces multiple embroideries, indicating that she was able to resume teaching "almost immediately after her public humiliation," Van Horn writes. By 1805 she had achieved her desired legal status of feme sole—a free single woman who could manage her own affairs.

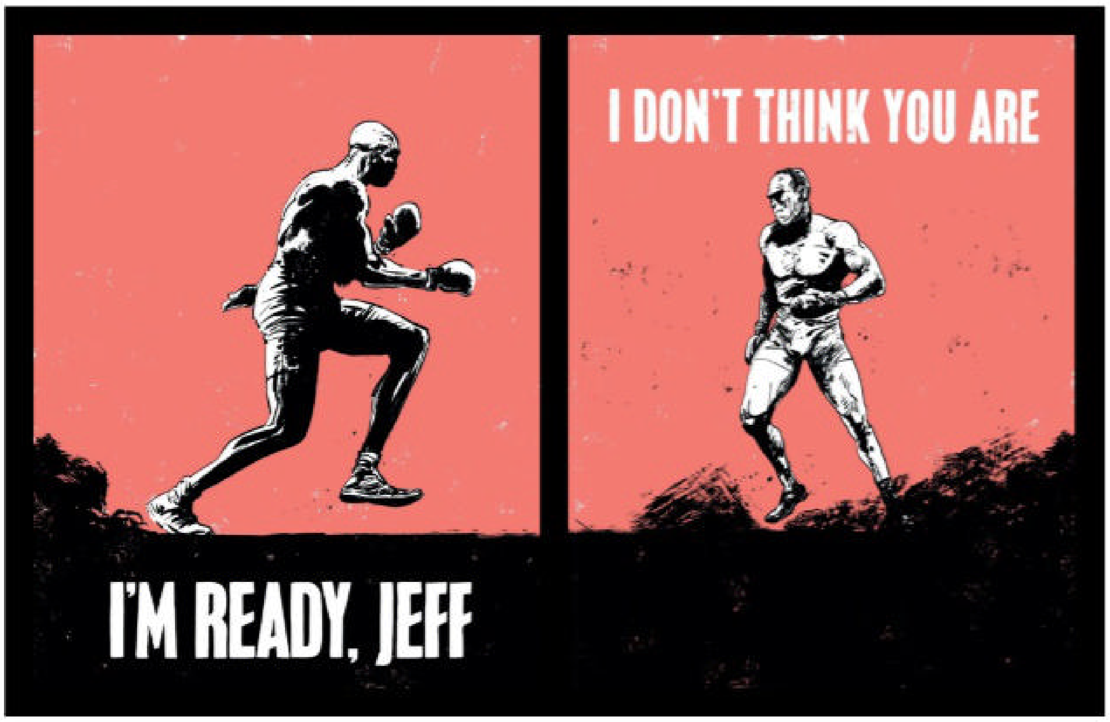
Snipping ties with Lancaster, Leah moved to Harrisburg and married again, to a quiet shoemaker, Isaac Maguire, taking his name. They opened a popular school, with plenty of students to embellish Bible verses.

Why did local parents overlook Leah's past, by then as checkered as her trademark borders? Perhaps not all the salacious details followed the "maiden lady" the 45 miles from Lancaster. Or maybe by then her body of work was proof enough of her worth: Even today, textile scholars consider her samplers among the finest of their form.

Certainly, Leah's students found her immensely fun. Fond of loud clothing and "fantastical headdress . . . of every variety of flowers," she played the fiddle at parties into middle age and urged "the young folks to dance, which was thought to be very fine," one contemporary observer wrote.

By the 1830s, sewing schools in the Northeast went out of vogue. "The emergence of the public school system in the 1840s meant that girls from all classes could attend," explains Amelia Peck, decorative arts curator at the Metropolitan Museum of Art. Sewing became a crafty pastime.

This 1828 sampler is among the last we have from Leah's school. The student who made it, Ann E. Kelly, has even conjured smoke with her needle. The lone maid in the center—bedecked in flowers, tending the fire and generally running the show—is likely inspired by a biblical or classical character, but it's possible to see a glimmer of the sewing teacher in her, too: the Madam, the maiden lady, the feme sole. ◆


I'M READY, JEFF
I DON'T THINK YOU ARE

Fight of the Century

A NEW GRAPHIC NOVEL TAKES READERS INSIDE A MATCH THAT SHOOK AMERICA

By **Brandon Tensley**

JACK JOHNSON WAS known for his patient boxing style—allowing his opponents to tire themselves out, then punishing them brutally once they'd run out of gas. With his uncanny timing and devastating blows, he became the first Black American to win the world heavyweight championship, in 1908. After that victory, many white commentators, including the novelist Jack London, fumed over Johnson's success and swagger, and agitated for Jim Jeffries, a white former heavyweight champion, to emerge from retirement and put Johnson in his place.

The big moment came on Independence Day 1910, before a crowd of 20,000 spectators in Reno, Nevada. In perhaps the most famous 15 rounds in American boxing, the out-of-shape but still formidable Jeffries took on the six-foot, 200-pound Johnson, nicknamed the "Galveston Giant" after his Texas birthplace. *Last on His Feet*, a graphic novel written by the American poet Adrian Matejka and illustrated by the Moroccan artist Youssef Daoudi (see the two panels above), revisits this "Fight of the Century," which wasn't just a landmark in athletics—it was a crucible for the racial animosity Black Americans had to navigate during Jim Crow. Through a stylish mix of prose, blank verse and illustrations, *Last on His Feet* captures these tensions with unsparing poignancy.

"Johnson's parents were enslaved, so he was from the first generation of Black Americans to grow up supposedly free," said Matejka, who in 2013 published *The Big Smoke*, a celebrated collection of biographical poems about Johnson. "But his brilliance, his idiosyncrasy, his adeptness in the ring and out were terrifying" to certain white people who wished to maintain a rigid racial order. In the end, Johnson bested Jeffries—an outcome that triggered racial unrest in more than one city.

When Johnson died in 1946, at 68, having lived the unapologetically extravagant life of a true celebrity, the headline on his obituary in the *New York Amsterdam News*, a Black-run newspaper, recalled the disdain many Americans had harbored toward the great fighter: "They Hated Jack Johnson For He Feared No Human." ◆

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2023 Canada Maple Leaf: A highly sought-after bullion coin since 1988, this 2023 issue includes the **FIRST** and likely only use of a transitional portrait, of the late Queen Elizabeth II. These are also expected to be the **LAST** Maple Leafs to bear Her Majesty's effigy. Struck in high-purity 99.99% fine silver at the Royal Canadian Mint.

2023 South African Krugerrand: The Krugerrand continues to be the best-known, most respected numismatic coin brand in the world. 2023 is the Silver Krugerrand's 6th year of issue. Struck in 99.9% fine silver at the South African Mint.

2023 China Silver Panda: 2023 is the 40th anniversary of the first silver Panda coin, issued in 1983. China Pandas are noted for their heart-warming one-year-only designs. Struck in 99.9% fine silver at the China Mint.

2023 British Silver Britannia: One of the Royal Mint's flagship coins, this 2023 issue is the **FIRST** in the Silver Britannia series to carry the portrait of King Charles III, following the passing of Queen Elizabeth II. Struck in 99.9% fine silver.

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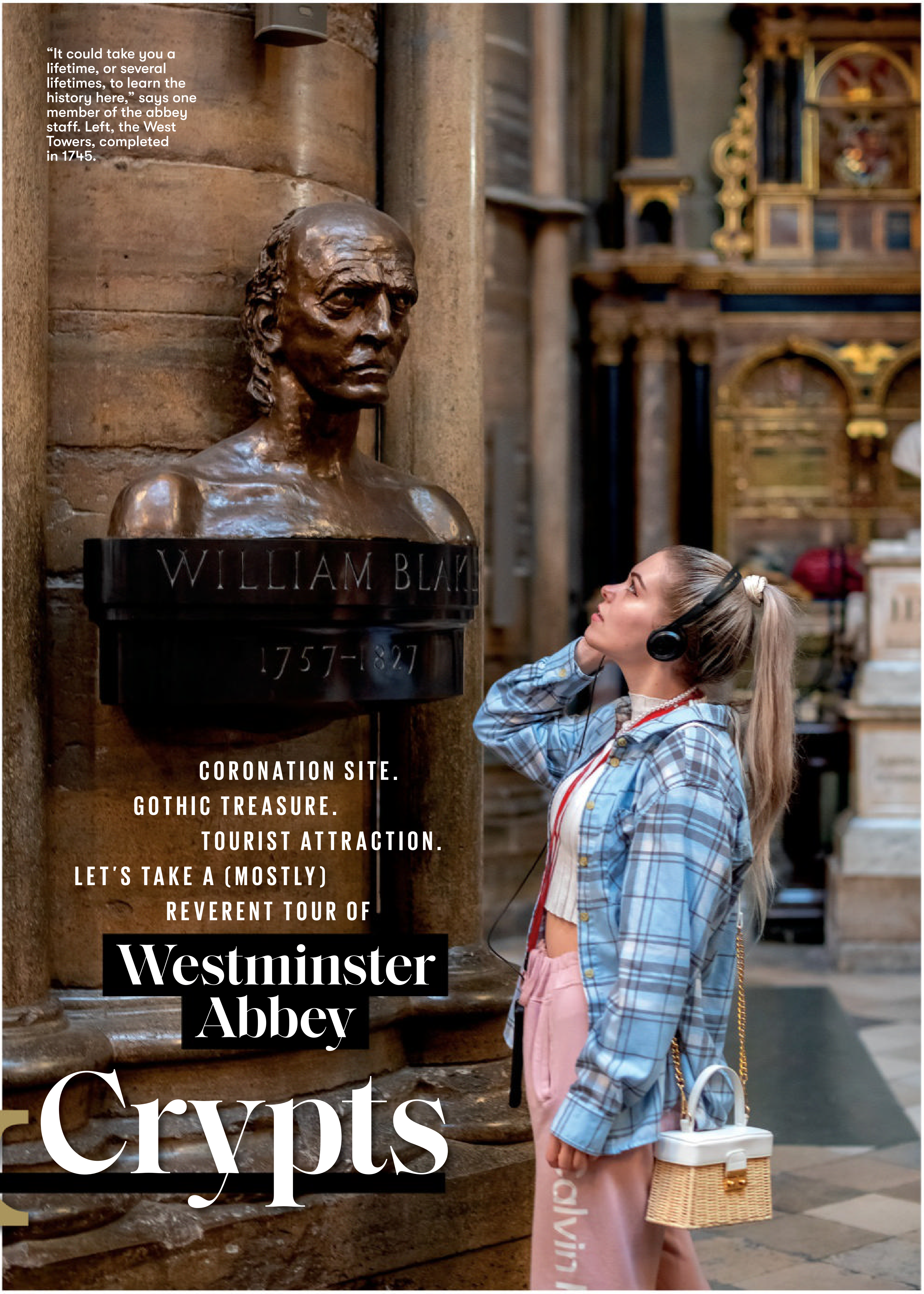
BY PETER ROSS

PHOTOGRAPHS BY JOONEY WOODWARD

Crowns, Choirs &

CORONATION SITE.
GOTHIC TREASURE.
TOURIST ATTRACTION.
LET'S TAKE A (MOSTLY)
REVERENT TOUR OF

Westminster Abbey & Crypts



"It could take you a lifetime, or several lifetimes, to learn the history here," says one member of the abbey staff. Left, the West Towers, completed in 1745.

SPECIAL ACCESS GRANTED BY METHODIST CENTRAL HALL

FIRST LIGHT IN LONDON. At the top of Westminster Abbey's northwest tower, Lee Robinson welcomes a new morning in a 1,000-year-old history by performing one of the building's quieter rituals.

"We do this at 7 in the morning, even in winter," he says. "When the sun's starting to rise you get a spectacular view."

He runs the flag up the pole—the abbey's coat of arms, a golden cross against bright blue. Flying above the great city, it seems to be in conversation with its fellows on the Houses of Parliament, the Supreme Court and Buckingham Palace, each of which Robinson points out from atop the tower. The flags of London speak a symbolic language. They announce whether the monarch is at home, which head of state is visiting the capital, whether the nation is mourning some death or disaster. Today, all is well, or at least it seems so from 225 feet and 4 inches up. The old stone tower gleams white in the sun as the sirens rise from the street.

Robinson, an amiable man in his mid-50s, is a Westminster Abbey beadle. It is an archaic word—most people, hearing his job title, might expect a frock coat and cocked hat—but it simply means that he is part of the security team. Within the abbey are buried thousands of illustrious dead: royals, nobles, writers, musicians, scientists, politicians—the great Britons of Great Britain. But it is the living, the abbey's 275 staff, who look after the building for present and future generations.

How you see Westminster Abbey will depend upon who you are. To the beadles, this is a workplace; to the tourist, an Instagrammable spectacle; to the pilgrim, a place of prayer. It is a site of royal power *and* a major tourist attraction, a historic monument *and* a living church, in which all are welcome to worship. On May 6, it will fulfill its vocation—the coronation of a king. Charles III will be the 40th monarch to be crowned there, the first being William the Conqueror on Christmas Day, 1066.

Thinking too deeply about such things can bring on a sort of vertigo, a feeling of centuries dropping away. Those who work here say that once they walk into the building their temporal perspective shifts. There is human time and there is abbey time. "You leave the here and now behind and go into another dimension," is how one staff member puts it.

Westminster Abbey was already ancient when New York was New Amsterdam; indeed, it is older than Amsterdam itself. It is much older than Germany, much older than Italy, a little older than France, and not much younger than England. It was founded around 960 as a Benedictine monastery on what was then a marshy delta, Thorney Island, formed where two streams of the Tyburn met the river Thames. There is now no sign that you are standing on an island, the Tyburn having long since been culverted and the land developed.

Edward the Confessor, the Anglo-Saxon king who was later made a saint, had a Romanesque church constructed on the site, beside his palace. It was consecrated on December 28, 1065, but the king was too ill to attend, died a few days later and was buried in the abbey. His successor, Harold Godwinson, ruled for nine months until his defeat and death at the Battle of Hastings. The Norman victor, William the Conqueror, made sure to have his coronation in the

The key to the Pyx Chamber, a low, vaulted room dating to the 11th century where royal gold and silver coins were stored in wooden chests (*pyxis* in Greek).

The 102-foot-tall Gothic vault is the highest in England. The 18th-century west window depicts the Hebrew patriarchs and the Twelve Tribes of Israel.

DROP CAP: ISTOCK PHOTO

abbey, seeking the legitimacy of association with Edward. Ever since, the abbey's fame and meaning have derived from these twin roles as royal burial place and crowning place, a church of bones and thrones.

Few traces of Edward the Confessor's abbey remain, but one can be found in a dim passageway between the east cloister and the chapter house. There are always a few tourists gathered round, taking pictures, chuckling as they translate the information panel into their own tongues.

"A porta mais antiga do Reino Unido!"

"La plus vieille porte du Royaume-Uni!"

"La puerta más antigua de Gran Bretaña!"

Britain's oldest door, the sign says. It looks as rough and solid as you would want. Five oak planks, ironbound, it was made in the 1050s for a church that is no longer there and repurposed for the present building. The wood from which it was built began to grow in Essex when England was not yet England, when it was still a patchwork of kingdoms. There is something comic about it, a touch of *Monty Python*—hence the affectionate laughter of visitors—but it is also a ghost and a portal into the past.

The abbey we see now is largely the creation of Henry III, who in the 13th century had Edward's church demolished and a new one built in the Gothic style. This spans 530 feet from the Great West Door to the far end of the Lady Chapel. Its interior covers 32,000 square feet. The grounds include ancient cloisters, homes of clergy and senior staff, and three gardens. The towers were completed in the mid-18th century; a beadle rising in the morning to raise the flag must first climb 315 steps.

But figures and dates cannot convey what it is like to wander within, amid the almost psychedelic geometry of vault and arch, where each footstep seems to bring you to another chapel and tomb. The abbey is dramatic in two senses. First, aesthetic: The "architectural equivalent to Shakespeare at his most swaggering," wrote the critic Ian Nairn. Then there is the drama contained inside: the strut and fret of history's great men and women who have passed across this stage.

◆

IF YOU HAVE SEEN or thought about Westminster Abbey lately, it will most likely have been in connection with the state funeral of Queen Elizabeth II, held there on September 19, 2022, before her coffin was borne by hearse to Windsor Castle. The ceremony, broadcast to a global audience, including 29.2 million viewers in the United Kingdom and 11.4 million viewers in the United States, showed the abbey in all its somber magnificence. The great vault of the nave. The gold of the high altar. The black and white marble of the quire floor, seen from a camera so high above that it gave the impression of a God's-eye view. Abbey staff had been planning the funeral for more than ten years.

"We all knew that we would one day have to take this service," the Very Reverend David Hoyle told me. "But we were all really startled when the moment came."

Hoyle is in his mid-60s, with short white hair and dark-framed spectacles. He is the dean of Westminster, the abbey's most senior priest. I had seen him on television in rich, colorful vestments, but here, in the book-lined study of the Deanery, his home within the abbey grounds, he was wearing a black shirt and white collar, and seemed more academic than priest.

The dean had led the queen's funeral service. His expression, for those of us watching, was hard to read, and I wondered what had been going through his mind.

As he sat near the altar, he recalled, he was highly conscious that here in front of him was the body of Her Majesty, and there behind him were the tombs and remains of many of her royal predecessors going all the way back to Edward the Confessor nearly 1,000 years earlier. This is the proper place, he thought, to carry out the ritual that would stitch Elizabeth II into the tapestry of history.

"But the one moment that really took me by surprise," he con-

Reg Greenacre, an abbey beadle, raises a flag bearing Westminster's coat of arms. Flags are rotated to mark festivals, state visits and other events.

tinued, "was at the very end of the service, when I had to step down and walk past the coffin. That was a bit of a hammer-blow. I thought, 'I will never see you again.' I didn't know her well, but I did see the queen more than a lot of people do, and I felt a great affection for her. That was a very personal moment."

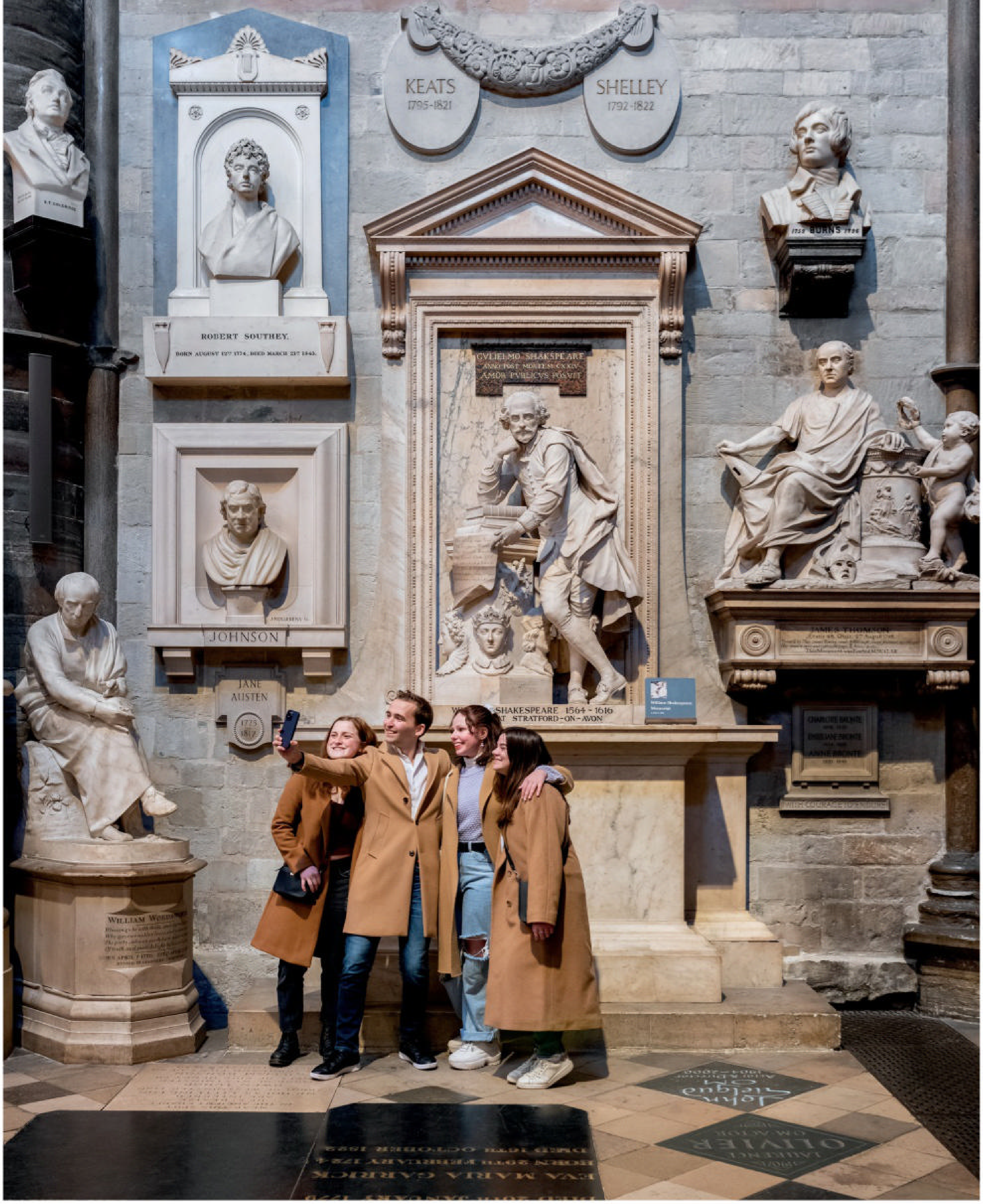
It is this confluence of scales, human and historic, that gives the abbey its particular atmosphere. How is a building like this kept alive? By people. By the dutiful care of those who work there. The clergy who hold services from morning till evening, and the cleaners who dust the tombs of monarchs who are now dust. The gardeners who tend this peaceful oasis in central London. The curators, conservators, choristers. The worshipers and visitors who bring money, but also—perhaps as importantly—loving attention. "I have to be seen to be believed," the queen famously remarked. This is also true of Westminster Abbey, a building that is powerful and meaningful to the extent that it impresses the public gaze. It's all very well being awesome, but you do need people to awe.

◆

ONE MORNING, the sun shining bright through stained glass, I walked up the nave, through the quire and past the high altar, then climbed a few wooden stairs into St. Edward the Confessor's Chapel, where I met the woman who cleans the tombs. Hannah Mills is in her mid-30s. She was wearing a headlamp to help her see dust and cobwebs on the gilt-bronze effigy of Richard II that, since the end of the 14th century, has lain upon his grave. These she removed with a goat-hair brush and a small vacuum cleaner slung around one shoulder. Dust is not just an aesthetic issue. It attracts moisture, which can lead to corrosion. However, the act of dusting can itself be damaging, and therefore the small team of "conservation housekeepers" go easy with their brushes, use no cleaning products and keep gentleness as their watchword. Mills pointed out the curls of the king's hair, and the stags and sunbeams that decorate his robe—"the finest examples of craft in the abbey," she said. "You can lose yourself in the patterns and designs."

Edward the Confessor's Chapel has his shrine at its center. Around this are the tombs of several kings and queens. Mills dusts in here once a week. She begins with Richard II before moving on to Edward III ("He's got a lovely beard"), Philippa of Hainault, Eleanor of Castile and Henry III. If she has time, she will attend to Henry V. He is made of wood, heavily varnished, so can be gone over with a cloth. About once a year she will go up a ladder for Anne of Bohemia, the first wife of Richard II, who died of plague in 1394 and is rather hard to reach.

One needn't be a monarchist or a Christian to sense what the dean calls a "spiritual electricity" inside the Confessor's chapel and elsewhere in the abbey. This is felt most readily at moments of quiet. Best of all is morning worship, as I found when I attended Holy Communion at 8 a.m. in St. Faith's, a narrow chapel off the south transept. There were only a dozen of us in the congregation. One was a tall young man wearing a crown who, I had heard, believed himself to be King Richard I. In that very English way, everyone pretended not to notice. The priest got on with the service. Candles flickered on the altar, wafers and



Selfies in Poets' Corner, where more than 100 illustrious writers are buried or memorialized, from Shakespeare and C.S. Lewis to Jane Austen.

wine were taken into the body, and it was pleasant to think that in the heart of the 21st-century city this ancient ritual remained part of the pulse.

◆

IT WAS MIDAFTERNOON. The abbey had closed to the public. A distinguished visitor was expected. Police and sniffer dogs had made their search, and now senior clergy lined up in scarlet cassocks, a welcoming party, while the dean, also in red, stood outside the western entrance to greet his guest. A shriek of whistles announced that the motorcade was on its way. Then the sleek black car pulled up and South African President Cyril Ramaphosa, dressed in a black coat, stepped out. He was in London as part of the first state visit hosted by King Charles. Such visits routinely include a tour of Westminster Abbey. U.S. President Donald Trump observed the tradition, as did Barack Obama, George W. Bush, Bill Clinton and Richard Nixon before him.

Hannah Mills, a conservation housekeeper, dusts tombs in the Lady Chapel. "Working with their faces and hands, you feel a connection to the person."

The abbey can thus be seen as part of the soft power of the British state. Yet despite this, it is entirely independent and receives no funding from the Crown, the government or the Church of England. Closed for stretches of 2020 and 2021 as a result of the Covid-19 pandemic, and deprived of overseas tourist income, at one point the abbey was losing a million pounds a month; staff numbers were reduced by more than a fifth. Even with the easing of lockdown restrictions, visits remained significantly down. Things only improved in spring of 2022, and, following the queen's funeral, numbers are back up to around pre-pandemic levels. "It's not a solution I would ever have wished for," Hoyle told me. Still, his relief was palpable. "I can begin to look forward to a day when the abbey is no longer in crisis."

Having shaken hands with a line of priests, Ramaphosa stood at the foot of a black slab set into the floor: the grave of the Unknown Warrior. The anonymous body interred here was brought in November

Head gardener Jan Pancheri relishes the 900-year-old College Garden. “It’s a little bit of wilderness even though you’re in the middle of London.”

1920 from a battlefield in France. Now a military attaché handed Ramaphosa a floral wreath, which he laid on the dark marble. The Unknown Warrior is intended to stand for those who fell “For God, for king and country,” as the inscription has it, but has come to represent all the fallen, of whatever side, and the human tragedy of war.

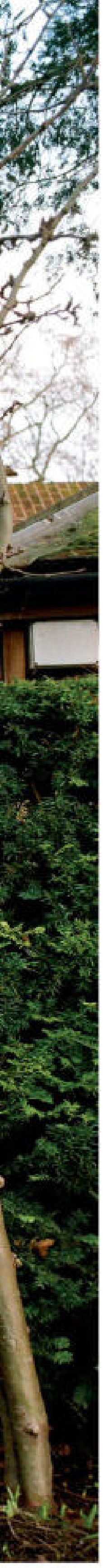
Here, in the abbey, the dead far outnumber the living. There is capacity for 2,000 visitors, but there are approximately 3,300 known burials and many more from early times that were unrecorded. “It is, indeed, the empire of death,” wrote Washington Irving, “his great shadowy palace where he sits in state mocking at the relics of human glory and spreading dust and forgetfulness on the monuments of princes.”

And not only princes. To walk in the abbey is to walk upon the graves of public figures from across the centuries. Slabs are everywhere set into the floor, often in clusters of disciplines. Scientists are grouped at the far end of the nave, by the north side of the choir screen. Isaac Newton died in 1727 and was buried there. His Latin epitaph reads, “Hic depositum est quod mortale fuit”—Here lies what was mortal of—“Isaaci Newtoni.” The ashes of the physicist Stephen Hawking were, in 2018, interred just a few steps away, beneath a slab carved with the English translation of Newton’s inscription, the two men having been Lucasian professor of mathematics at the University of Cambridge 300 years apart. How remarkable that those whose minds probed the farthest corners of the universe should rest in the same few feet of earth. What goes up must come down, as Newton surely knew.

Poets’ Corner, in the south transept, is famous as the burial place of writers. Geoffrey Chaucer, who died in 1400, established the trend, though the best-

Detail of a six-foot-tall bronze candelabra by the sculptor Benno Elkan (1877-1960), one of two candelabra depicting figures from the Old and New Testaments.

Thanks to Victoria Ribbans, deputy head of communications, for the extraordinary access to Westminster Abbey.



known grave is that of Charles Dickens. He did not want to be there. His preference had been to be buried without fuss in a country churchyard near his home in Kent, but a rousing editorial in the London *Times*—“very few are more worthy than Charles Dickens of such a home”—led his family to seek a place in Westminster Abbey. He was buried on June 14, 1870. The grave, left open for three days, filled with flowers as the public paid their respects. “I never knew an author’s death to cause such general mourning,” wrote Henry Wadsworth Longfellow from Cambridge, Massachusetts. “It is no exaggeration to say that this whole country is stricken with grief.”

The burials in the abbey span so great a period of time that strange associations develop. Henry V is an English hero on account of his victory over the French at Agincourt in 1415. His eve-of-battle speech, as imagined by Shakespeare—“We few, we happy few, we band of brothers”—was the emotional centerpiece of Laurence Olivier’s 1944 film of the play. The ashes of Olivier were interred in the abbey in 1991; at the memorial service, a recording of the famous speech was played, filling the church with the actor’s glorious bellicosity and echoing over the tomb of King Henry, whose valor inspired the words that now rattled his bones.

Shakespeare himself was not buried in the abbey. His grave is in his native Stratford-upon-Avon. But his friend and rival Ben Jonson is here. So poor was the dramatist at the time of his death that he was buried upright, as he could not afford the floor space. Different versions of the story state that the cost was met by either King Charles I or the dean of Westminster. The small gray marker, on which Jonson’s name is misspelled, is shuffled over, unnoticed, by crowds lining up for evensong. I was shown the spot by a marshal in a red cloak. He introduced himself as Howard and said, “What I love about this place is that there are pockets of magic everywhere.”

◆

WHERE TO FIND OTHER POCKETS? Try the abbey gardens. The largest of these, College Garden, goes back to the abbey’s earliest days. Here the Benedictines grew vegetables, kept orchards for apples and plums, and cultivated plants essential for nutrition and medicine. There have been no monks at Westminster since the mid-16th century. These days, College Garden is a peaceful sanctuary in the busiest part of the capital, enclosed by a 14th-century wall. It is open to abbey visitors but not well known. “My primary objective in life is to try and make people realize how important this garden is,” said Jan Pancheri, the abbey’s head gardener, as we took a walk one cold morning. She showed me the herb garden that she has created in homage to the monastic past: rue and rosemary, marjoram and mint, hyssop and sweet cicely. She has a strong feeling, especially in winter, for the presence of the brethren who once tended this ground; when, in the course of their work, she and the other gardeners uncover what they take to be the bones of monks, they dig them back into the earth.

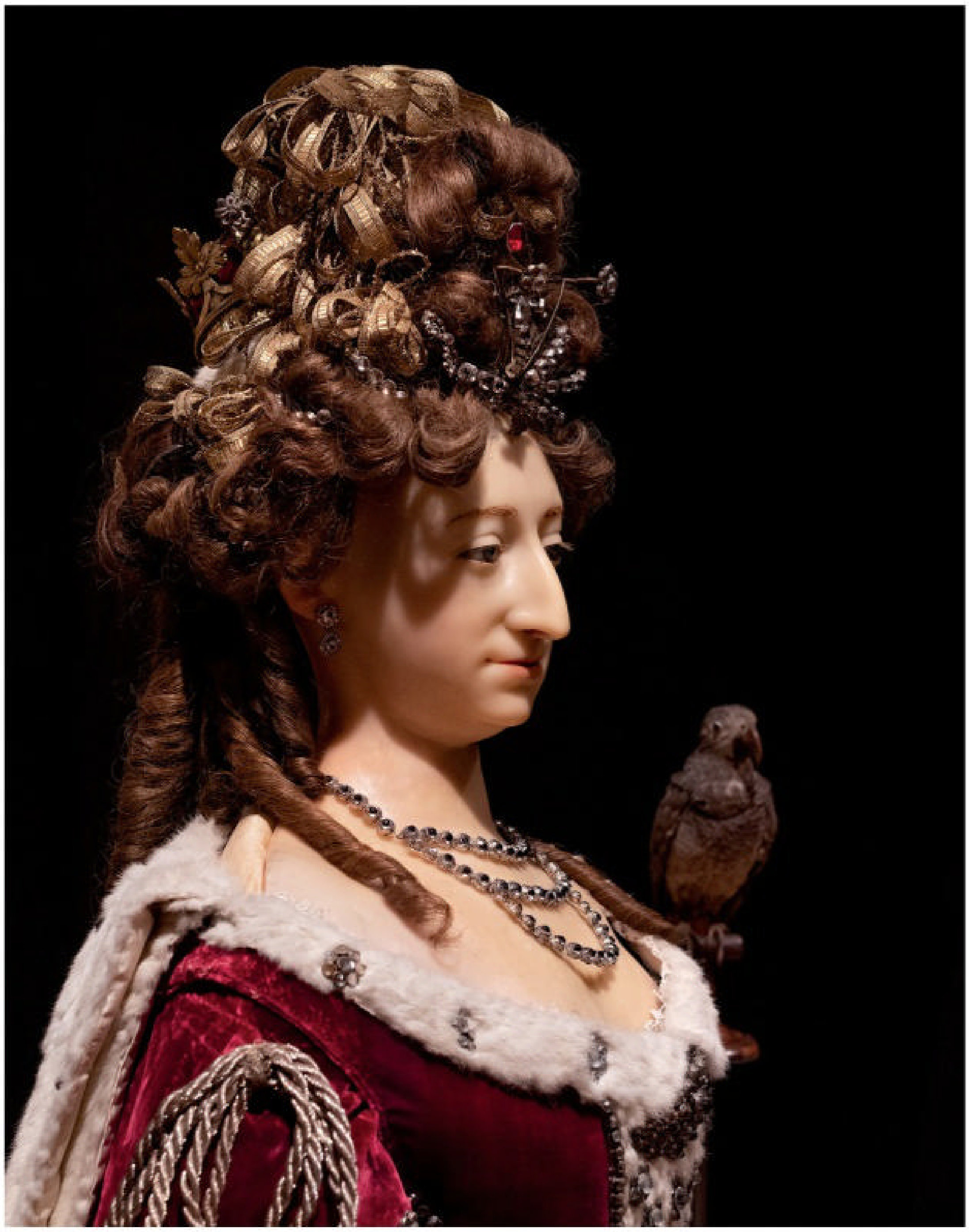
The garden itself feels like a presence to her, a kind of consciousness. She began working here in 1999, not long after losing both of her parents, and the gardens have been a comfort. “When I come to work in the morning, it’s like a pair of green arms coming to welcome you,” she said.

Far above the gardens, in an upper part of the abbey known as the triforium, is another pocket—the Queen’s Diamond Jubilee Galleries. Here are objects of powerful strangeness: the funeral effigies of nobles and royals. The early ones were made from wood, and later from wax. They make an impression very different from the durable bronze or stone effigies on the tombs in the church below, and they served a different purpose. Beginning in the 14th century, immediately following the death of a royal, a carved likeness of the late king or queen was dressed in a wig and finery and processed on top of their coffin through the streets of London to the church. Until the early 19th century these figures were sometimes left to lie or stand by the tomb of the person they represented. Twenty have survived: 11 of wax, 8 of wood, 1 of plaster. Vanessa Simeoni, the head conservator, told me that if the abbey suffered a fire like the one that engulfed Notre-Dame in 2019, these effigies are what she would rush to save: "They are so rare and incredible."

Most of these people are buried downstairs, but up here they enjoy a curious afterlife. The earliest figures, naked and missing limbs, some suffering gouges or pocked with what look like the holes of beetle larvae, bring to mind eerie tales of automata or the leathery agonies of bog bodies. The later effigies, dressed in silk and velvet, have such an unsettling fairy-tale quality that one finds oneself grateful for comic touches. Frances Stuart, the Duchess of Richmond, commissioned her effigy in her will. It is exhibited alongside her beloved parrot, an African grey. Stuart died in 1702, the bird soon afterward, and while the noblewoman is made of wax, her pet is stuffed; X-rays have shown that its skeleton is complete. Virginia Woolf, in 1928, seemed much taken with this parrot and thought it an ironical comment on the narcissism of its owner, who, she wrote, "was beautiful once and had lovers beyond belief."

› A monument to John, Lord Russell (d. 1584), inside the chapel of St. Edmund. The effigy of his infant son, Francis, is at his feet. Both are buried in the chapel.

A wax effigy of Frances Stuart, Duchess of Richmond (d. 1702), a great beauty famed for refusing King Charles II. The stuffed parrot was her pet.



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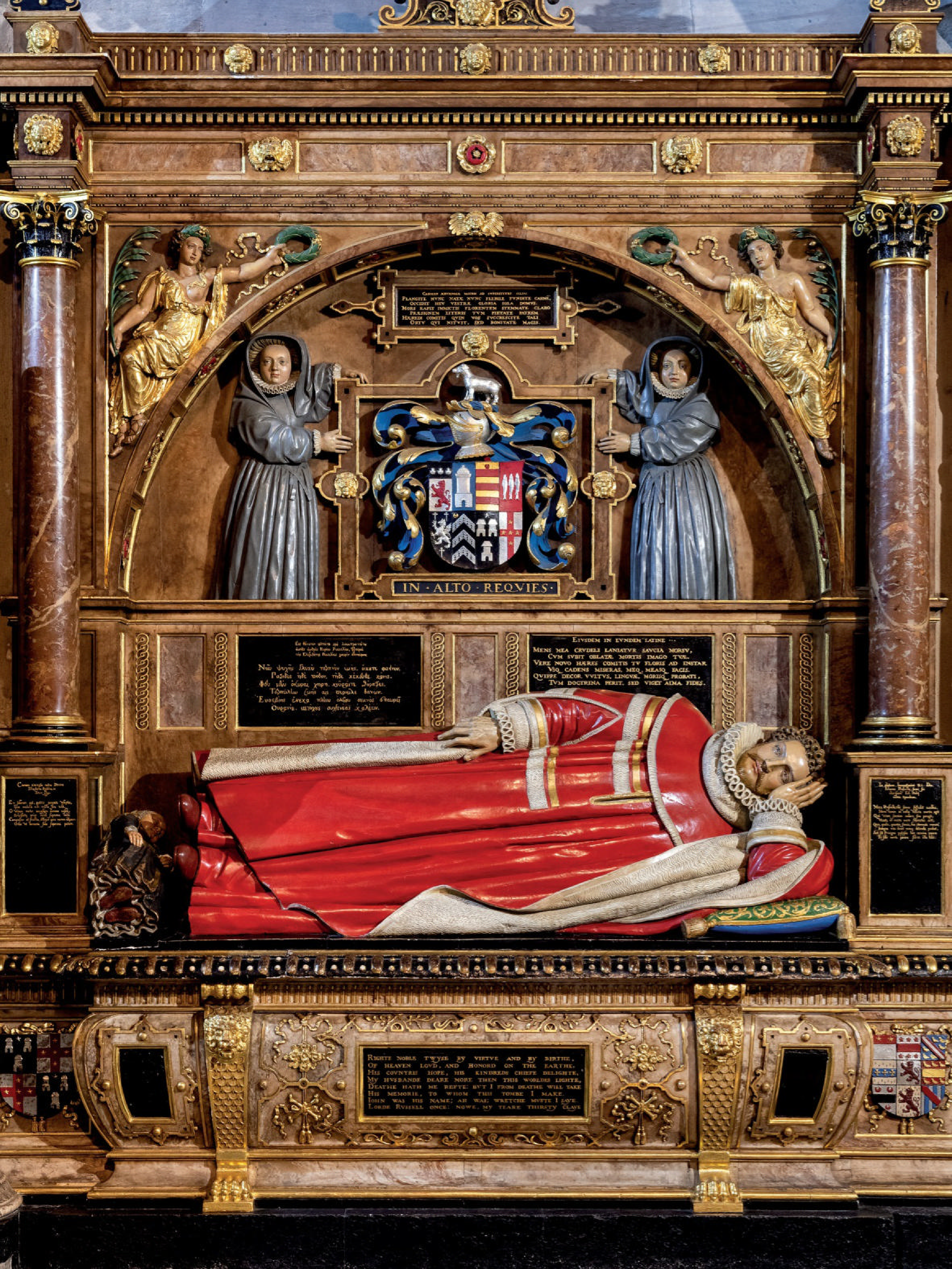
"AND HERE IT IS," said the dean.

Hoyle and I were standing by the Coronation Chair. This is where monarchs are crowned. It was made in 1300. Once it would have been golden, but now much of the wood is exposed, and it is badly carved with graffiti from the 18th and 19th centuries. This vandalism was carried out by boys from Westminster School and others who had access. The chair was not always regarded as an almost sacred relic. Vergers used to charge visitors a fee to allow them to sit in it. Some, clearly, found it an easeful spot. "P. Abbott slept in this chair 5-6 July 1800" is carved into the seat.

Today the chair is kept secure behind glass near the Great West Door, but for the coronation it will be brought to the heart of the abbey and placed on the Cosmati Pavement—the name by which the area of swirling, kaleidoscopic flooring in front of the high altar is known. The ancient pavement is 24 feet and 10 inches square and made from 90,000 pieces of glass and hand-cut stone, much of it recycled from Roman mosaics. It features Latin inscriptions that calculate the date of the end of the world. Chair and pavement were made within 30 years of each other, but it has been a long time since they touched. Badly damaged, the pavement was covered with carpet in the 19th century. In recent years, though, it has been conserved and restored. The Cosmati has a circle of pink onyx at its center, resembling a planet seen from space, and it is likely that during the forthcoming ceremony the chair will stand on or near this. It will be a bringing together of objects of spiritual and temporal power: the stone, the chair, the king, the crown.

At 73, on the death of his mother, Charles became the oldest person to accede to the British throne. He was a child when he saw her crowned. Now it is his turn. This coronation will take place in a very different nation from 1953. Then: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HÆREDEM COMITIS QVIN VOS SVCCRESCITE TALI
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CVM SVBIT OBLATÆ MORTIS IMAGO TVÆ.
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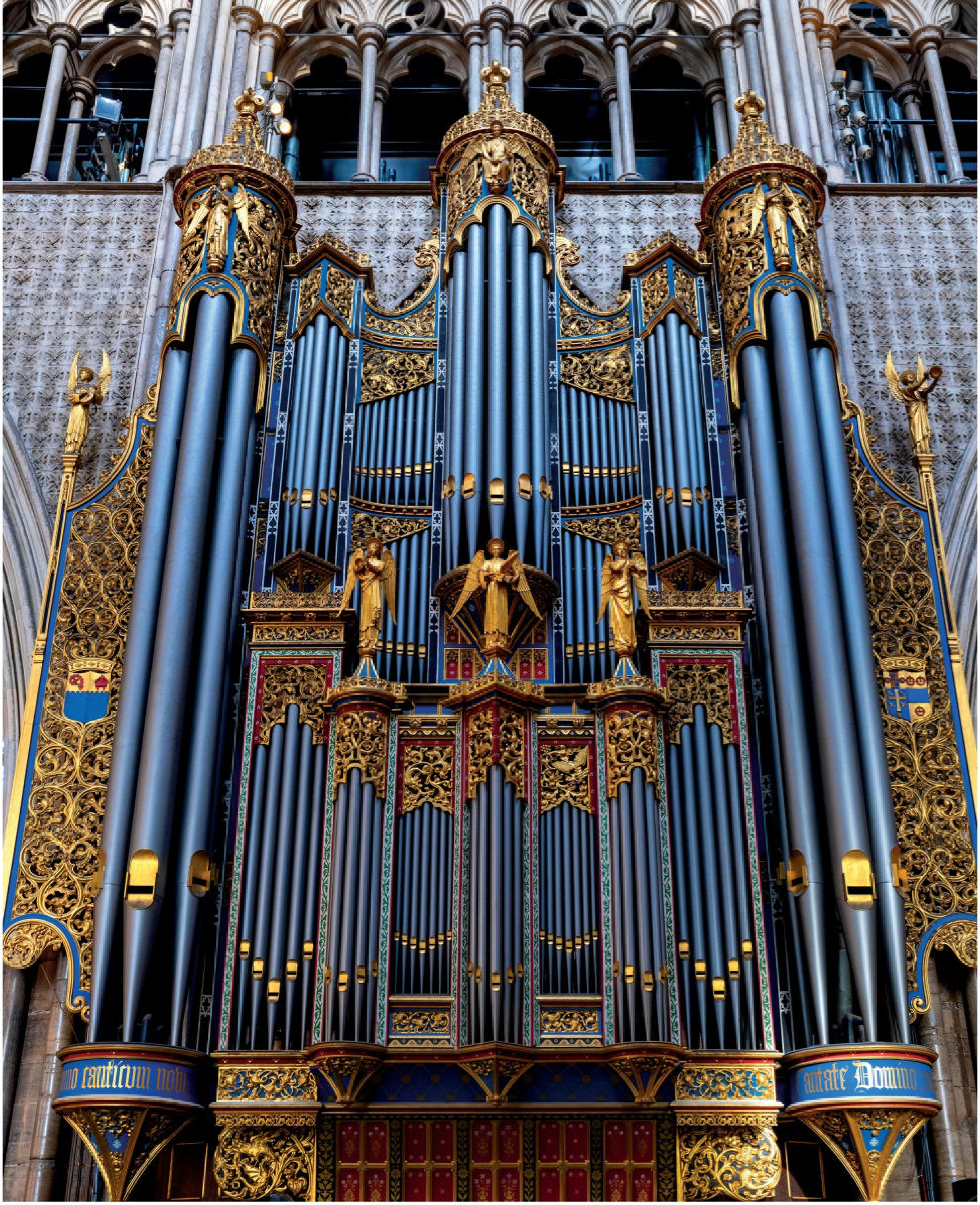
LORDE RVSSELL ONCE: NOWE, MY TEARE THIRSTY CLAYE



^ The organ, installed in 1937 for King George VI's coronation. The instrument incorporated pipes from the 19th century and was expanded in the 1980s.

a young woman becoming queen in an atmosphere of postwar renewal and optimism. Now: an old man inheriting a kingdom that feels disunited, weary and worn, its gilding coming off.

It will, no doubt, still be a spectacular occasion. The abbey will look magnificent. The crowds outside will cheer. Viewers at home will watch the coverage with whatever mixture of voyeurism, skepticism and patriotism reflects their attitude. But can it really be a unifying event? Britain, like America, has its culture wars, its partisan divides. Shared national institutions—the church and monarchy among them—no longer feel quite so shared.

"This is the gathering place for the nation and the Commonwealth," Hoyle had told me as we sat in his Deanery. "But the abbey as a convening space is a much more complicated thing than it used to be. We have a weaponized political discourse at the moment. People define themselves largely by their associations and their dislikes. If you're

CONTINUED ON PAGE 120

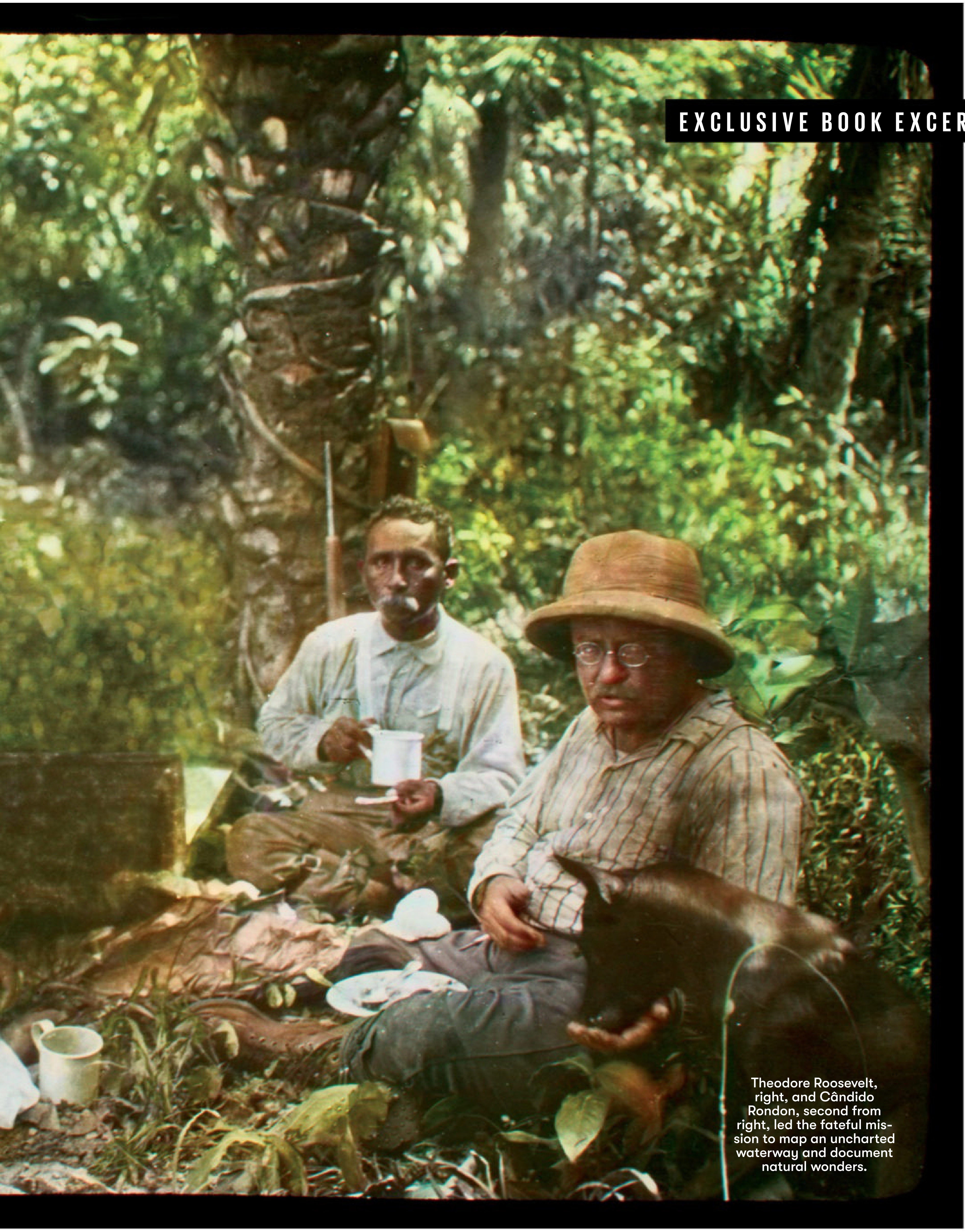
In addition to singing daily services, the choir performs and records a wide repertoire spanning six centuries, including new commissions.

A FORMER U.S. PRESIDENT. BRAZIL'S LEADING EXPLORER. AND *a deadly voyage in the Amazon*

DOWN THE RIVER ROOSEVELT

▸ *by* **LARRY ROHTER**

▸ *photograph colorization by* **DANA KELLER**



Theodore Roosevelt, right, and Cândido Rondon, second from right, led the fateful mission to map an uncharted waterway and document natural wonders.

KERMIT ROOSEVELT / LIBRARY OF CONGRESS

It ranks as one of the greatest feats of exploration in modern times. For five months, beginning in mid-December 1913, a team composed at its peak of more than 100 men, Brazilian and American, made its way across South America's great heartland, by land and on rivers, on foot and by horse, mule, truck, steamboat, barge, launch and canoe, moving supplies, pack animals and boats across more than 2,500 miles.

Two men of markedly different backgrounds led this extraordinary undertaking. Theodore Roosevelt, only a few years removed from the American presidency, was among the world's most celebrated figures. But throughout the time he was in the wilderness, he mostly deferred to his more experienced Brazilian counterpart, a 48-year-old Brazilian Army colonel named Cândido Mariano da Silva Rondon.

By any measure—number of expeditions, distances traversed, degree of difficulty, information gathered—Rondon is the greatest explorer of the tropics in recorded history, with a list of accomplishments that eclipses those of better-known figures such as Henry Stanley or Richard Francis Burton. All told, he participated in more than a dozen expeditions through Brazil's northern wilderness, surveying his country's hitherto-unknown territory, mapping its borders, building roads and bridges, founding settlements, and making the initial, peaceful contact with dozens of Indigenous groups.

That Rondon himself was Indigenous, an orphan from the state of Mato Grosso ("dense jungle" in Portuguese) who rose to become a marshal of the Brazilian Army and spoke four European and six Indigenous languages fluently, made him as comfortable in the cafés of Rio de Janeiro as in the remotest corners of the Amazon, able to move easily between the worlds of science and shamanism.

Trained as an astronomer and engineer, Rondon was devoted to promoting scientific awareness of the Amazon and its peoples. A national commission bearing his name published more than 100 scientific papers, in disciplines as varied as anthropology, astronomy, biology, botany, ecology, ethnology, geology, herpetology, ichthyology, linguistics, meteorology, mineralogy, ornithology and zoology. Scientists under Rondon's direction discovered and cataloged scores of new animal, plant and mineral species. Many of his own scientific papers documented the languages of Indigenous peoples or sought to explain their cultures, cosmology, rites, social structure and religion.

Roosevelt was a genuine naturalist who "let no opportunity to acquire knowledge pass," Rondon said, and "passionately devoured books."

As the founder, in 1910, of the Brazilian government's Indian Protection Service, or SPI, which he led for decades afterward, he fought to defend Brazil's Native peoples from the ranchers, miners, loggers and rubber

LIBRARY OF CONGRESS (2)

Rondon had already spent 25 years exploring; building roads, bridges and a telegraph line; and peacefully making contact with isolated Indigenous communities.

tappers who coveted their land, and he battled the intellectual and political leaders openly calling for their extermination on "scientific" grounds.

On his own expeditions, Rondon adhered to a policy of absolute nonviolence in his dealings with tribal groups, many of them previously uncontacted: The SPI's motto was "Die if you must, but kill never." As early as 1925, Albert Einstein, astonished during a visit to Brazil by the man the press called the "pacifist general," nominated Rondon for the Nobel Peace Prize, and when Rondon died, the International Red Cross saluted him as an apostle of nonviolence whose life and work, "like that of Gandhi," constituted a victory for "the forces of peace."

Rondon's construction of a telegraph line across Brazil's vast, rugged interior, often with the assistance of local Indigenous groups, played a central role in the country's transition from a haphazardly organized empire to a modern republic, and it resonates to this day in the country's psyche as a feat of national integration in the way the transcontinental railroad was celebrated in the United States.

Thus when Roosevelt, restless for an adventure after an unsuccessful 1912 bid for a third presidential term, made contact with Brazilian authorities about planning an expedition into the uncharted forest, there was no question within Brazil's government who would guide him. In his memoirs, Rondon wrote that he agreed to take Roosevelt through the Amazon only "under the condition that the expedition not limit its activities to a series of excursions to hunt for big game," and that serious scientific work be undertaken.

Of the five itineraries Rondon proposed, the most ambitious was to descend the Rio da Dúvida—the River of Doubt—which he had first encountered during an expedition in 1909 and had yearned to explore ever since. No one knew how long the river was, nor the kind of terrain through which it flowed, much less where its waters discharged—hence its provisional name.

Roosevelt promptly chose the itinerary that, in Rondon's understated assessment, "offered the greatest number of unforeseen difficulties." A descent of the river, Roosevelt wrote, "could be made of much scientific value," and with it "a substantial addition could be made to . . . geographical knowledge."

What Rondon proposed was exploration in its purest, most challenging form. The principal focus would be cartography, with the work to be carried out in terrain utterly unknown to either science or geography.

When friends at the American Museum of Natural History urgently wrote Roosevelt in Brazil to warn him off the plan before he set out for the jungle, he responded coolly, "I have already lived and enjoyed as much of life as any nine other men I know. I have had my full share, and if it is necessary for me to leave my bones in South America, I am quite ready to do so."

RONDON WAS AS COMFORTABLE *in the cafés of Rio de Janeiro* AS IN THE REMOTEST CORNERS OF THE AMAZON.

* * *

THE RIVER DESCENT ITSELF began on Friday, February 27, 1914, following a grueling two-and-a-half-month trek through the Pantanal, Brazil's vast inland swamp, and across the Mato Grosso plateau. Breakfast was jerky, hardtack and coffee. Then the last supplies were loaded onto the canoes. "One was small, one was cranky, and two were old, waterlogged and leaky," Roosevelt wrote. "The other three were good."

The smallest, most maneuverable dugout was first in line, carrying Roosevelt's 24-year-old son, Kermit, who had volunteered as lookout, and two skilled paddlers named João and Simplício. Kermit had been in Brazil since graduating from Harvard in 1912, working as an engineer, supervising the construction of railroads, trestles and bridges. Rondon and Lieutenant João Salustiano Lyra, his second in command, followed in the next boat. Roosevelt—who for security reasons had the expedition's doctor, José Antônio Cajazeira, constantly at his side—was assigned with George Cherrie, an American naturalist, to the last and largest of the canoes, a 25-footer weighing more than a ton, and given three paddlers. Sandwiched between Rondon's and Roosevelt's canoes were two jury-rigged rafts loaded with cargo, each assigned four boatmen.

To the Brazilians, there was nothing unusual about the 16 *camaradas*, the "comrades" who paddled and performed the most demanding tasks while descending the river. Like Rondon, they were individuals of mixed European, Indigenous and African ancestry and also tough backwoodsmen. But the Americans were amazed by the uncomplaining durability of the men, most of whom went about without shoes or shirts, slept in randomly strung hammocks, and worked long hours with little food. "They were expert river-men and men of the forest, skilled veterans in wilderness work," Roosevelt wrote. "They were equally at home with pole and paddle, with ax and machete." They were also "hard-working, willing and cheerful," he continued. "Good men around camp."

The first day passed uneventfully as Rondon and Lyra began to map the upper reaches of the River of Doubt. Such work would be quick and easy today. But a century ago, without GPS or even meaningful aerial mapping, Rondon and his men did everything manually, by compass and solar observation, using an onerous method known as "fixed position" sighting. When an appropriate location was found, the spotter jumped ashore, cleared away brush with his machete and raised a red-and-white sighting pole until surveyors in a separate boat measured the angle and distance between their position and the sighting rod. Then the spotter would hop back into his canoe, and the process would be repeated at the next stop.

"I AM NEITHER A GREAT MAN, NOR IS THIS A MINOR DETAIL. *Mapping the river is* INDISPENSABLE."

Rondon, in the second canoe, meticulously recorded measurements into notebooks custom-made in Rio de Janeiro. Lyra used a state-of-the-art theodolite, a precision instrument that computes angles in both the horizontal and vertical planes, and Rondon had a compass and a barometer to gauge the river's altitude above sea level.

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A meal on the move, January 1914. From left, seated, John Augustine Zahm; Rondon; George Cherrie; Kermit Roosevelt (seated on oxhide); Leo Miller; Jacob Sigg; Amilcar Armando Botelho de Magalhães; José Antônio Cajazeira; João Salustiano Lyra; Roosevelt; Anthony Fiala.

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But making frequent stops to calculate position soon grew exhausting: Rondon's field journal indicates that the expedition halted 114 times that first day, barely advancing seven miles. The River of Doubt was a puzzling and unpredictable stream, twisting and turning in every direction. Rondon's logs from that first afternoon show that at one time or another the river's course flowed in the direction of each of the four cardinal points of the compass.

Rondon was pleased, though, at how the trip had begun. "We obtained an abundant supply of game," he wrote. "In addition to game birds, we retrieved honey; it was jubilation when we came across a milk tree, a giant of the forest called that because of the thick white liquid that oozed from any cut made in its bark and which the camaradas drank avidly."

The next day they made nearly 100 stops to mea-

sure location. A routine was shaping up—one that would underscore the often conflicting goals of the American and Brazilian expedition members, generating tensions that would persist throughout the descent.

Roosevelt wanted to get down the river as rapidly as possible, reach Manaus and travel home. He was still a public man, with political aspirations, and during the time he had been in South America he had watched anxiously as the global situation deteriorated (which would soon lead to the outbreak of the First World War). Unable to voice his opinions from afar, he was impatient to leap back into the fray.

Kermit was equally restless. He had recently become engaged to Belle Willard, the Virginia-bred daughter of the U.S. ambassador to Spain, and was obsessed with reuniting with her. His diary was filled with musings about her and dreams of their future together, and he carried her letters to him in a pouch around his neck so that they would not be lost.

Rondon, by contrast, had waited nearly five years to return to the river he had discovered, and he intended to exploit this opportunity to explore it. He had forewarned Roosevelt himself that this would not be a safari but a bona fide scientific expedition, and he expected every member to do his part.

◆

THE MEN FACED THEIR first big challenge on the afternoon of March 2. The river suddenly accelerated, and they found themselves bouncing through rapids, with water foaming angrily ahead. The paddlers quickly pulled off to the right bank, secured the canoes and set up camp, while a scouting party hacked their way through the brush to reconnoiter.

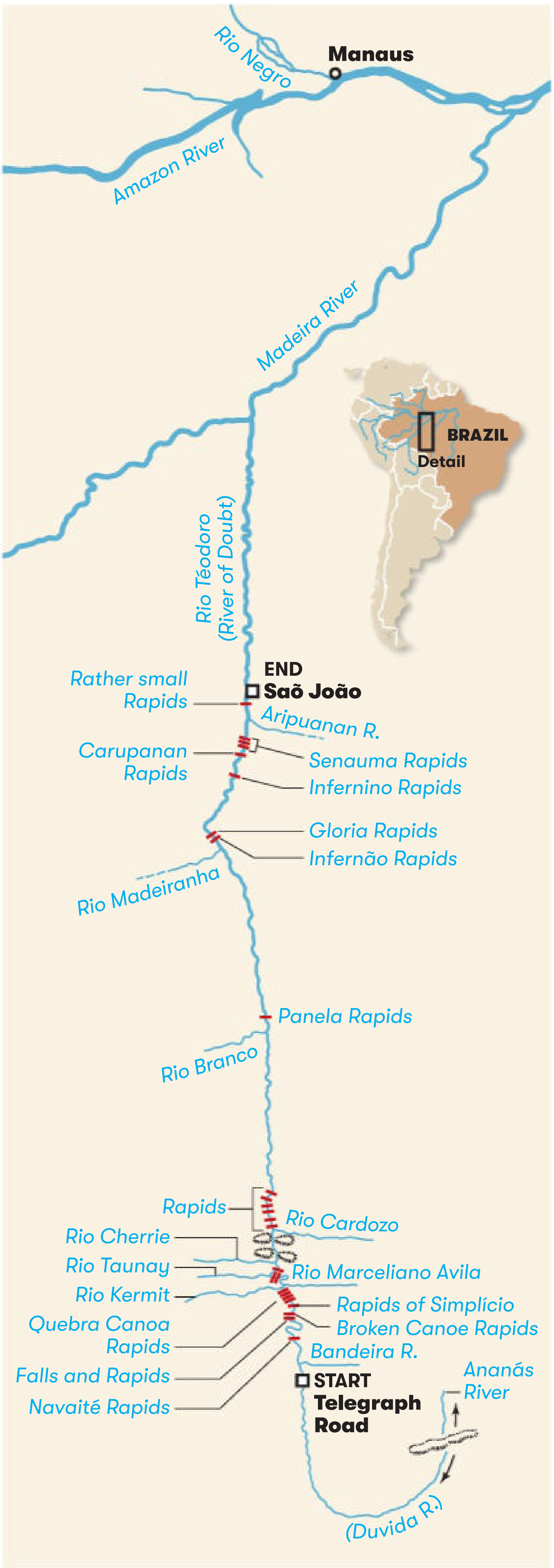
What they discovered gave everyone pause. For half a mile, the river bounded downward through a series of boiling rapids, which were broken by a pair of waterfalls six feet high. Then it narrowed dramatically and surged through a jagged sandstone gorge. "It seemed extraordinary, almost impossible," Roosevelt wrote, "that so broad a river could in so short a space of time contract its dimensions to the width of the strangled channel through which it now poured its entire volume."

It took an entire day to tote food crates, tents, duffel bags and scientific equipment to a new campsite below the rapids. Rondon exempted from that task one ailing paddler and Kermit, who had developed a painful case of boils on his thighs, but both of the expedition's commanders joined the others in transporting the gear.

Early the next morning, Lyra and a party of camaradas headed into the forest with axes and machetes to fell dozens of trees and cut their trunks into rounded logs. They placed these along a portage trail evidently used by local Indians, thereby creating a skidway along which they could drag the canoes. Meanwhile, another team heaved the empty dugouts from the riverbank, to be pulled along the skidway one by one.

AQUA INCOGNITA

A version of Theodore Roosevelt's hand-drawn map, created after the journey using its findings


Rio Negro
Manaus
Amazon River
Madeira River
BRAZIL
Detail
Rio Teodoro
(River of Doubt)
END
Saõ João
Rather small Rapids
Aripuanan R.
Carupanan Rapids
Senauma Rapids
Infernino Rapids
Gloria Rapids
Infernão Rapids
Rio Madeiranha
Panela Rapids
Rio Branco
Rapids
Rio Cardozo
Rio Cherrie
Rio Taunay
Rio Marceliano Avila
Rio Kermit
Rapids of Simplício
Quebra Canoa Rapids
Broken Canoe Rapids
Bandeira R.
Falls and Rapids
START
Telegraph Road
Ananás River
Navaité Rapids
(Duvida R.)

MAP: GUIBERT GATES

This was backbreaking work, magnified in difficulty by the insects that swarmed, bit and stung. A pair of camaradas was stationed in front of each of the canoes, each connected to the boat by a drag rope fastened around his torso. A third stood behind with a pole, which he used to guide the canoe as it clumsily slid down the uneven log path. Several dugouts slammed into sandstone ledges to the left; at least one was split badly. Still another made it all the way down the trail only to slip free of the ropes and, as it was lowered back into the water, sink to the bottom; it was retrieved with strenuous effort by the exhausted camaradas.

The expedition resumed its journey at midday on March 5. The next day, though, the explorers encountered more rapids and were forced to steer to the riverbank. A scouting party discovered that some 400 yards downstream the river smashed into a line of giant boulders, impeding all passage, followed by at least a mile of rapids and a pair of waterfalls about 100 yards apart. Another portage awaited, even longer and more difficult than the first.

"We had no idea how much time the trip would take," Roosevelt would write. "We had entered a land of unknown possibilities."

* * *

ON MARCH 15, as the first two canoes rounded a bend in the river, the stream widened, dividing into two sets of roiling rapids separated by an island. Rondon, sensing trouble, ordered his dugout to pull to the side and called to Kermit's canoe to do the same. But Kermit either did not hear Rondon or chose to ignore his command. The lead canoe plunged forward, heading directly for the island.

Kermit and his boatmen, João and Simplício, progressed barely a dozen yards when their canoe was sucked into a powerful downdraft, which spun the craft around. The canoe reached the end of the rapids upright only to be seized by another whirlpool, which hurled it back to midstream, overturning it.

Now all three men, tossed into the foaming water, were battling for their lives. João grabbed for the towline and swam for shore but could not maintain his hold on the rope. Kermit managed to climb onto the keel of the overturned canoe and ride it, like a bull at a rodeo, through a second set of rapids before being thrown off. Desperate and exhausted, his waterlogged clothing weighing him down, he swam for shore, where he could only cling to a branch until he had recovered his breath.

Kermit was back on land, walking to find the others, when Rondon and Lyra encountered him on the trail. "Well, you have had quite a splendid bath, eh?" Rondon said to the younger Roosevelt. There is no way to know if his tone was sarcastic, in reproach to what he perceived as Kermit's youthful heedlessness, or whether he was making a sympathetic joke, relieved that the son of his eminent guest had not perished. But where were João and Simplício?

Kermit Roosevelt, 24 and newly engaged to be married, joined the Amazon journey to appease his mother, who worried about Teddy.

KERMIT ROOSEVELT / LIBRARY OF CONGRESS (2)

João showed up not long after, having swum back across the river. But there was no sign of Simplício. In addition, the canoe was lost, along with the supplies in it. Devastated, Kermit set out on his own to search for Simplício. He walked for several miles but recovered only one paddle and a single food tin. Simplício's body was never found.

In his diary, Kermit was guarded about his boatman's death, writing only, "Simplício was drowned." For his part, Roosevelt portrayed the disaster as simply an accident of fate. In a private conversation with Rondon, though, João said that Kermit had heard Rondon's command to stop but decided to see if they could run the rapids to the island's right and ordered the boatmen ahead.

With no body to bury, Rondon had the men erect a memorial cross reading "Here perished the unfortunate Simplício" at the edge of the rapids. He also named the falls in Simplício's honor, and they appear as such on Brazilian maps even today.

In every account of the Roosevelt-Rondon Scientific Expedition over the past century, Brazilian or American, Simplício has always been identified merely by his first name or as "poor Simplício." But in Rondon's records is Simplício's complete name: Antônio Simplício da Silva.

* * *

ANOTHER EXHAUSTING PORTAGE began amid sheets of rain. While the camaradas felled trees for a skidway, cleared brush and hauled the canoes from the river, Rondon and his favorite dog, Lobo, headed down a jungle path to do reconnaissance and, with any luck, shoot a game bird or a monkey for meat. But half a mile from camp, a peculiar howling echoed through the forest—almost, but not exactly, like that of a spider monkey, the largest simian in the jungle and an excellent source of meat.

Lobo instinctively bounded ahead as Rondon peered into the canopy, his rifle at the ready. Within seconds, though, he heard his dog yelping, first in surprise, then in pain.

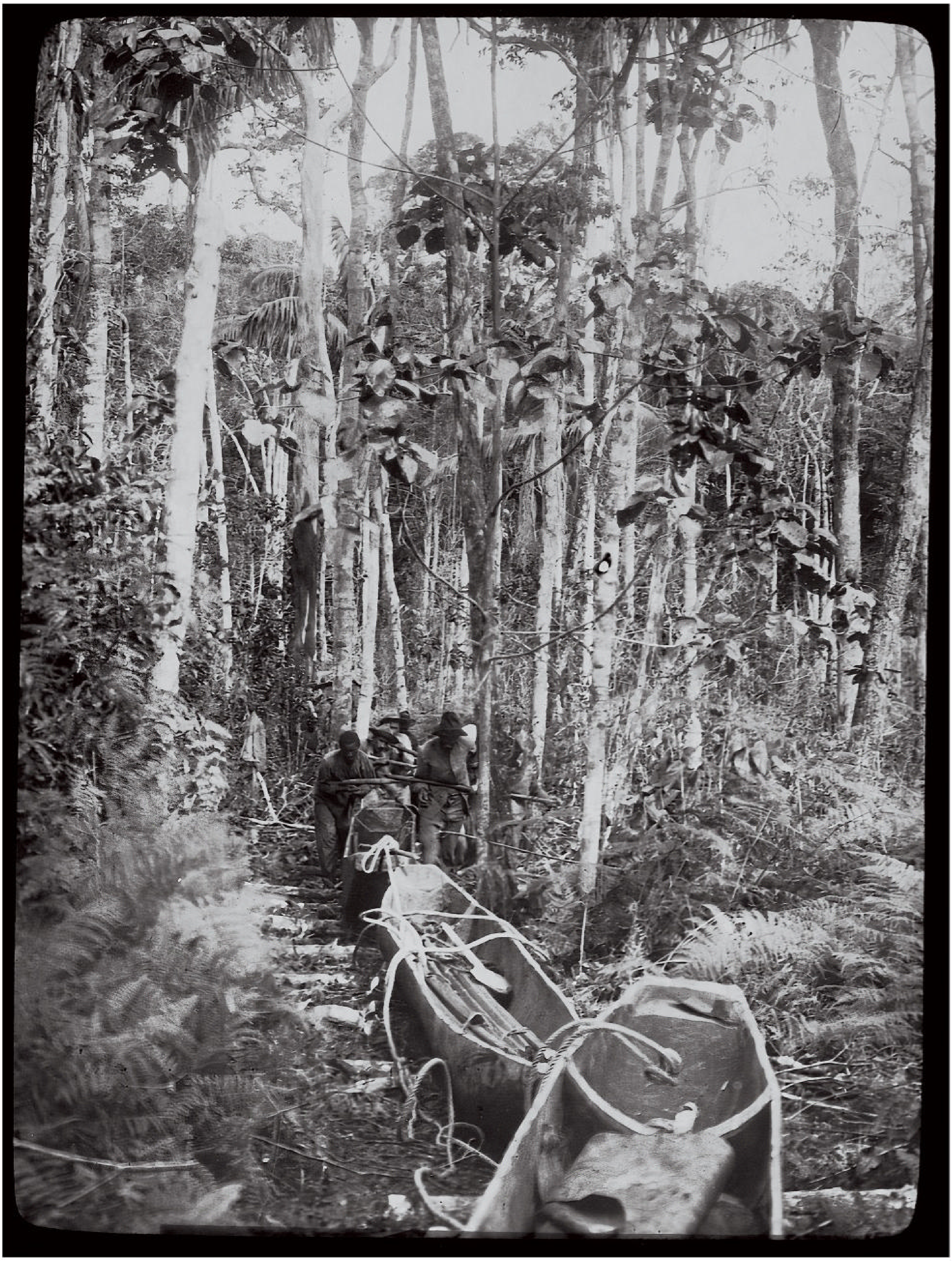
He advanced cautiously, registering unwelcome human sounds: "short exclamations, energetic and repeated in a kind of chorus with a certain cadence" that he had heard before only when Indigenous war parties were "ready to commence the attack." He fired a single warning shot in the air, "overcoming my initial impulse to run and defend Lobo," then hurried back to camp.

Rondon's immediate concern was an ambush. He dispatched Cherrie to warn the camaradas upstream, asked Roosevelt to mount guard at the end of the portage, and with Kermit, Lyra and the Indigenous scout Antônio Paresi accompanying him returned to the trail in search of Lobo. When they reached the dog, it was already dead—pierced by a pair of poison-tinged arrows whose design was unfamiliar to Rondon and Paresi. Before returning to the site of the ambush, Rondon had grabbed several ax heads and stuffed his pockets with colored beads—presents for what he assumed was a hunting party frightened by his approach.

He buried Lobo next to a basket full of animal entrails the Indians had brought as bait, probably for fishing, but abandoned as they fled. Around Lobo's grave Rondon arrayed his gifts, to signal to the Indigenous group—likely members of the people known as the Cinta Larga, whose relations with the outside world continue to be tense and even violent into the 21st century—that his intentions remained peaceful.

Rondon had been lucky, and he knew it. "I thought, mournfully contemplating my dead companion, that perhaps he had given his life for mine."

The explorers were now down to four canoes, simply not enough to carry 21 men and their equipment. To continue, the



When the river proved impassable, the men hauled their canoes on the trunks of felled trees they used as a skidway. “Life became one portage after another,” Theodore Roosevelt wrote.

canoes would have to be lashed together to form a pair of rafts, each with three paddlers and one principal aboard, and loaded with as much equipment as they could support. The remaining equipment would have to be discarded, and the rest of the men would hack their way along the overgrown riverbank until they reached a new campsite, alert to any sign of an Indian attack.

Rondon em expediente

* * *

THE MEN NAVIGATED two sets of rapids that way. At the other end, Rondon and Kermit encountered a deep river some 70 feet wide gushing into the River of Doubt from the west. This was a significant discovery: It meant the River of Doubt itself did not flow west from here, but rather likely flowed northward for hundreds of miles—eventually disgorging into the Madeira River, the Amazon's largest tributary, as Rondon had guessed.

The Cinta Larga no longer bothered to keep their surveillance secret and waged an unrelenting campaign of intimidation. Though concealed in the jungle, they were very close, for the dogs were constantly barking at some unseen presence. As the explorers hewed to a narrow path along the riverbank, they saw fresh footprints in the mud that were not their own, and they heard rustling in the bush just beyond. "The footprints, the abandoned camps, and the voices of unseen people became uncanny," Cherrie wrote.

Yet Rondon halted the expedition at a bend in the river when he noticed an abundance of araputanga trees—easy to carve, resistant to rot, light in weight and buoyant in water, and thus advantageous for making desperately needed canoes. Roosevelt objected, but Rondon reassured him by mounting a nightlong guard for the first time; he himself awoke at 2 a.m. to make sure the lookouts hadn't fallen asleep.

Two days later, the replacement canoes were finished. But now various health problems were beginning to emerge among the overtaxed boatmen. "We were crossing enemy territory, tormented by mosquitoes and ants," Rondon wrote. "The camaradas who didn't want to wear shoes had feet that were now so swollen that they could barely carry on. Cajazeira tried to relieve everyone's suffering and maintain in good condition the health of everyone in the expedition, but there were already two cases of fever."

The Americans were increasingly worried. "Our position is really a very serious one," Cherrie wrote in his diary. "Provisions are every day decreasing. It is impossible to go back. The journey ahead is undoubtedly a very long one." He concluded the entry on a fatalistic note: "It is very doubtful if all our party ever reaches Manaus."

On March 22, Roosevelt challenged Rondon about how the exploration work was being carried out. "Kermit was extremely lucky to escape alive from the accident in which Simplício perished," he told Rondon, according to the only surviving account of the conversation, from Rondon's diary. "I simply cannot tolerate seeing my son's life threatened at every turn by the presence of the Indians, threatened more so than any other member of the expedition, since he is in the lead canoe." Roosevelt also questioned Rondon's insistence on cartographic precision, which he felt slowed them down. "Great men don't concern themselves with minor details," he said.

"I am neither a great man, nor is this a minor detail," Rondon responded. "Mapping the river is indispensable, and without it the expedition, as far as I am concerned, will have been entirely pointless."

But Rondon agreed to abandon the fixed-position method of mapping, which would mean fewer stops, in favor of a less precise method calculated from a pair of canoes in motion. He also acquiesced to one of Roosevelt's demands: "Kermit will no longer go in front."

They'd been on the river exactly a month when, maneuvering a pair of dugout canoes through a set of narrow rapids, several camaradas lost their hold on the boats, which rammed into rocks and began to sink.

Responding to shouts for help, Roosevelt jumped into the water and, chest-deep in the turbulent stream, joined the men in "straining and lifting to their uttermost." He gashed a shin badly on a jagged rock. Blood began to spurt from the wound.

At camp, Roosevelt tried to play down the severity of the injury, which he attributed to "my own clumsiness." Cajazeira dressed the wound with antiseptic and wrapped it in gauze. Roosevelt stayed off his feet for two days, but then, walking downriver to the next campsite, he was forced to pause repeatedly because of the pain. Upon arriving, Roosevelt "lay flat down on the damp earth for some time before recovering," Cherrie wrote. Not only did Roosevelt's wound become infected, but soon it was clear he was also suffering attacks of malaria. His temperature soared to 105 degrees, and he slipped into delirium.

One night, just before dawn, Cherrie heard Roosevelt call his name, and he rushed to his side. Kermit was already there. "Boys, I realize that some of us are not going to finish this jour-

ACERVO DO MUSEU DO INDIO / FUNAI - BRASIL ney," Roosevelt said. Looking squarely at Cherrie, he went on, "I want you and Kermit to go on. You can get out. I will stop here."

* * *

ROOSEVELT'S DETERIORATING HEALTH was only one of many menacing problems. Their supply of food depleted, the men's physical performance was diminishing—increasing the likelihood of accidents—as was their morale.

Even Rondon, ever stoic, appeared disheartened. Early on March 28, he and Kermit, accompanied by Lyra and Luiz Correia, a paddler, set out on foot from their camp to reconnoiter a daunting canyon that lay ahead. When they returned, filthy, drenched in rain and sweat, bruised and drained of energy, the dazed and somber look on Rondon's face told the others that he had bad news.

‹ Rondon inside a field tent during an extraordinary 1905 expedition to construct a telegraph line across the Pantanal, Brazil's vast inland swamp.

‹ Descending the River of Doubt, Roosevelt, center, was given the largest and most stable canoe. Few of the boats would survive the voyage.

ALAMY

The canyon continued for almost two miles, and its flow of water was broken by a half-dozen cataracts, one of which was more than 30 feet high. Rondon saw no way to navigate through that gantlet in the canoes, but he also deemed it impossible to detour around the gorge with another portage. Worse, the canyon marked the start of rocky, hilly terrain that extended for miles.

So Rondon proposed a desperate solution: abandon the canoes, reduce equipment yet again, hike to the end of the mountains and build new canoes there. "To all of us his report was practically a sentence of death," Cherrie wrote.

Kermit openly disagreed with Rondon. He had acquired formidable rope-handling skills while working as an engineer, and he and Lyra thought they could get some of the canoes through the canyon. Roosevelt supported his son, as did Cajazeira and the camaradas, who worked closely with Kermit and liked him. Rondon, overruled, gave in, but for the first time the others could read doubt on his face.

It took nearly four days to get the canoes through the canyon. "Hard work; wet all day; half ration" was Kermit's laconic summary in his diary on the second day. But they succeeded with only the smallest canoe sacrificed, and with no loss of life.

Almost immediately, though, the group was thrust into a new crisis. After they made camp, at dusk, on April 2, Manoel Vicente da Paixão, a towering Black army corporal Rondon had placed in charge of the camaradas, caught a paddler named Julio de Lima stealing food from the ration tins. The brawny Paixão punched the thief in the face and warned him against raiding the provisions again. The next morning, while the men hauled crates down to the canoes, another paddler caught de Lima secretly gobbling the last of a tin of beef jerky. Then Paixão noticed him straggling behind the others, carrying a much lighter load, and dressed him down again. Arriving at the staging point, Paixão laid down the carbine he carried before heading back to fetch another load. De Lima was not far behind him.

Suddenly the crack of a firearm echoed above the rapids. Roosevelt, rifle in hand, and Cajazeira, armed with a revolver, rushed up the trail. They found Paixão lying facedown in his own blood. The doctor, kneeling to examine him, noted the gunpowder residue indicating that de Lima had fired point-blank, shooting Paixão through the heart.

"IT IS IMPOSSIBLE TO GO BACK. . . . IT IS VERY *doubtful if all our party* EVER REACHES MANAUS."

Now everyone was in danger. De Lima was still armed and hiding nearby. Rondon was "in a blind rage to kill" him, Kermit wrote. But the commander soon recovered his equilibrium and ordered his most capable scouts to try to pick up de Lima's trail and apprehend him. Roosevelt had already sent Kermit and Cherrie to guard the canoes, so Rondon ordered a pair of camaradas, duly armed, to watch over the provisions. Others got to work digging a grave for the esteemed Paixão.

The scouts returned, holding de Lima's carbine aloft, which they had recovered from a tangle of vines, where he appeared to have abandoned it. This greatly reduced the risk that de Lima might attempt to kill someone else, and it left the murderer defenseless. Turning to Roosevelt, Rondon remarked: "Now he will be punished by the force of the circumstances in which he has placed himself."

* * *

THE EXPLORERS, down to 19 weary and dejected men, hastily buried Paixão, then resignedly returned to their portage.

Roosevelt was feverish again and so short of breath that he could take only a few steps before pausing. "Mr. Roosevelt arrived after great effort, worn out by the pathway, which rose sharply along the rocky mountainside," Rondon wrote. "Such brutal exercise was excessive for his state of health, and made him suffer horribly."

Roosevelt was aware he could no longer keep up. "The expedition cannot delay," he told Rondon. "On the other hand, I can't go on. Move on and leave me!"

Rondon wouldn't hear it. "Allow me to observe," he said, "that this expedition bears the names of Roosevelt and Rondon. It is therefore not possible for us to separate."

That night, as Kermit and Cajazeira took turns caring for him, Roosevelt slipped into a delirium and repeatedly recited the opening lines of Coleridge's poem "Kubla Khan": "In Xanadu did Kubla Khan / a stately pleasure-dome decree." Then he descended into gibberish, with occasional bursts of lucidity reflecting concern for his companions: "I can't work now, so I don't need much food," Kermit would recall his father saying, oblivious to his son's presence. "But he and Cherrie have worked all day with the canoes, they must have part of mine."

Roosevelt's fever broke just before dawn. On the morning of April 5, Palm Sunday, it appeared the expedition was finally nearing the end of the long, narrow canyon. Kermit, now feverish himself, accompanied Rondon and Lyra on a hike downstream and concluded, as he wrote in his diary, "that after these rapids we're out of the hills." They returned to camp just in time to hear Paresi excitedly announce that he'd spotted spider monkeys in the canopy nearby. Kermit and Cherrie grabbed their guns and shot three of the animals; Kermit captured a turtle, which went into the pot. "The fresh meat we all craved gave us renewed strength and energy," Cherrie wrote, "and the fact that the mountains that had for so long hemmed us in seemed at last to be falling away from the river brought us new courage."

* * *

ON EASTER SUNDAY, the explorers spent eight hours hauling their equipment while the canoes ran the rapids. "Father not well," Kermit wrote that night. "Much worried."

The next day, Roosevelt was so debilitated that he had to travel flat on his back, shielded only by a piece of canvas and what remained of a broad-brimmed straw hat that insects had mostly consumed. He "won't be with us tonight," Cherrie would later recall thinking.

On April 15, Rondon, now in the lead canoe, spotted a crude sign nailed to a tree along the riverbank and carved with the initials "J.A." Before long, the explorers found a thatched hut in the middle of a planted clearing, guarded by three yelping dogs. Inside were sacks of cassava flour and rice as well as an ample supply of yams. But the owner, a rubber tapper, was not there, and Rondon refused to allow his famished men to help themselves to the provisions. Instead, he left a note listing the names of all the surviving members of the expedition and where they had come from.

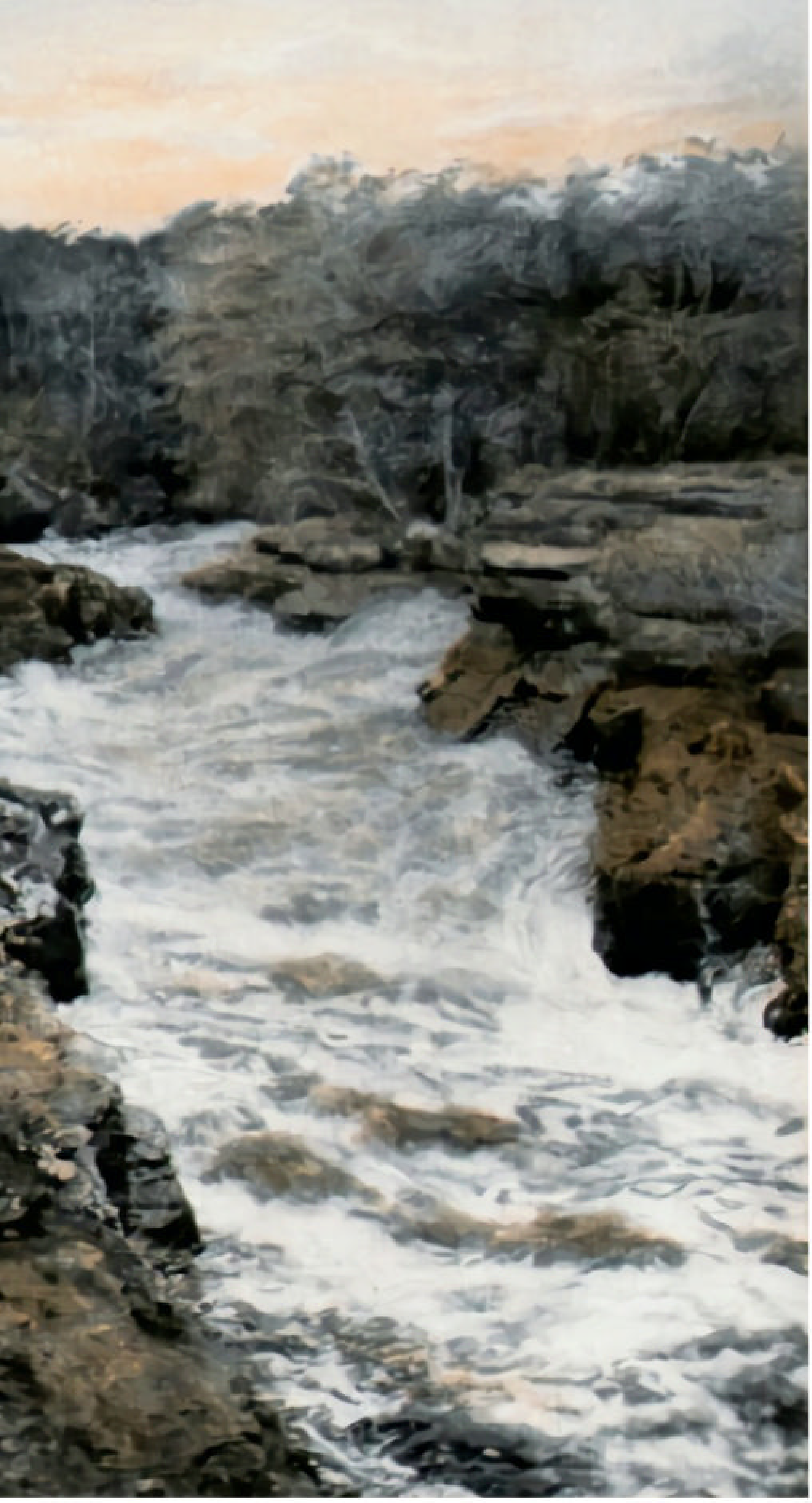
Several miles downstream, the explorers encountered another person, an old man who, assuming they were an Indian war party, frantically began to paddle away. It was only when Rondon stood up, waved his helmet, and called out to him in Portuguese that the rubber tapper allowed the four dugouts, filled with emaciated, feverish, bearded men in rags, to come alongside. The man had no food to share, but he told Rondon that they could obtain provisions from other rubber tappers nearby. A few miles downstream, the explorers saw puffs of smoke coming from a hut, and a woman with a baby in her arms rushed outside, took one look at them, screamed and ran off into the jungle.

Rondon ordered the paddlers to stop and make camp while waiting for the woman to return, presumably with her husband. Kermit and Cherrie carried Roosevelt to the hut and laid him on a cot. The cook already had a fire going when the couple appeared with two neighbors armed with rifles. But once they realized that their guests, though haggard, were part of a government party, they were generous and helpful with food and information.

That night, a camarada named Antônio Correia remarked to Kermit, "It seems like a dream to be in a house again, and hear the voices of men and women, instead of being among those mountains and rapids."

The next morning, Cajazeira operated on Roosevelt's leg—and without anesthetic, for Roosevelt had not mentioned that he kept a vial of morphine hidden in his belongings, in case he needed to take his own life. While the canoes were being packed, Cajazeira sliced into the swollen tissue and watched it empty of pus. He then inserted a drainage tube into the incision. Roosevelt lay silent. When Cajazeira finished, Kermit and Cherrie helped the weakened patient into the dugout.

The following day, while Rondon and Lyra took advantage of a cloudless sky to plot the expedition's coordinates, Kermit visited local rubber tappers and came back with five pounds of rice. Six hours downstream, they encountered a man Kermit called "a certain Barbosa" in a riverside manor house. The man not only "gave us a duck and a chicken and some cassava and six pounds



‹ Navaíte Falls, the expeditionists' first major challenge. The dangerous cataract consisted of a mile of rapids and a pair of six-foot waterfalls, followed by a narrow gorge.

GEORGE K. CHERRIE

of rice, and would take no payment," Roosevelt recorded, but he furnished them with new clothes. He also accepted a small canoe in exchange for use of a large, flat-bottomed boat, big enough to erect a tent to protect Roosevelt from the elements.

But the infection spread throughout Roosevelt's body, and he developed an abscess on his right buttock so severe that he could not sit down. "He eats very little," Cherrie wrote. "He is so thin that his clothes hang like bags on him."

The expedition was moving quickly now, and after a set of rapids the explorers found a general store, the first they had seen in more than three months. The next day, April 23, the explorers began to encounter heavily laden *batelões* making their way upstream, carrying food and other supplies to remote settlements. The boat pilots all recognized Rondon. One after another, they passed on the good news: A welcome party was waiting for them at the junction of the Castanho and the Aripuanã Rivers, only four days away.

The weary and bedraggled men reached the confluence of these two majestic rivers on Sunday, April 26. Behind them lay almost unimaginable trials and privations that resulted in the deaths of three of their group, prostrated many with illness and forced each to endure long periods of hunger. Ahead loomed worldwide acclaim for the feat they had accomplished: mapping the previously unknown tropical River of Doubt over the course of its nearly 1,000 miles.

The next morning, Rondon formally renamed the River of Doubt. It would be the Roosevelt River. The men drove a wooden obelisk into the spongy ground and gathered around it for a series of photographs. Hat in hand, eyeglasses fogged in the intense humidity, Roosevelt was visibly haggard and gaunt: His clothes hung loosely from his body, and he held on to the obelisk to steady himself. Rondon, several inches shorter than Roosevelt and dozens of pounds lighter, posed almost nonchalantly in his simple olive military garb, his hands thrust into his jacket pockets and an impassive expression on his lean, copper-colored face.

ROOSEVELT SHOOK HANDS *with every camarada* AND GAVE EACH TWO GOLD SOVEREIGNS.

* * *

LESS THAN A WEEK LATER, Roosevelt lay recuperating in a bed at the governor's palace in Manaus. Cajazeira had spirited the former president from his quarters aboard the government steamship that had picked them up at the camp of a rubber baron and operated immediately, lancing Roosevelt's abscess and draining it. He also gave the former president heart medication and prescribed a strict regimen of quinine.

Roosevelt sent a telegram to his wife announcing that he and Kermit had survived, and another message to the Brazilian foreign minister in Rio de Janeiro. "We have had a hard and somewhat dangerous but very successful trip," he wrote, before enumerating the expedition's perils and major achievements. "My dear Sir, I thank you from my heart for the chance to take part

CONTINUED ON PAGE 122

BYLINES

Larry Rohter, a former Rio de Janeiro bureau chief for the *New York Times*, is the author of *Into the Amazon: The Life of Cândido Rondon*.

Graphic designer **Dana Keller** says adding color to historic photographs offers "a glimpse into the world as it was."

SCHOOL

OF ROCKS

photographs and text by **Ben Huff**

TREKKING ACROSS A MASSIVE ICEFIELD IN ALASKA TO LEARN THE STONE-COLD FACTS ABOUT GLACIERS IN A CHANGING CLIMATE

Left, students note the site of a lichen-spotted boulder. Right, Demorest Glacier and Devils Paw, the icefield's highest peak.

Students and instructors cover 75 miles or more during the summer, switching from hiking boots to crampons to cross-country skis as the terrain changes.

Abby Watts, a college student from Juneau, Alaska, is standing on a nunatak—an exposed ridge above an icefield. All around her are enormous boulders in varying shades of gray.

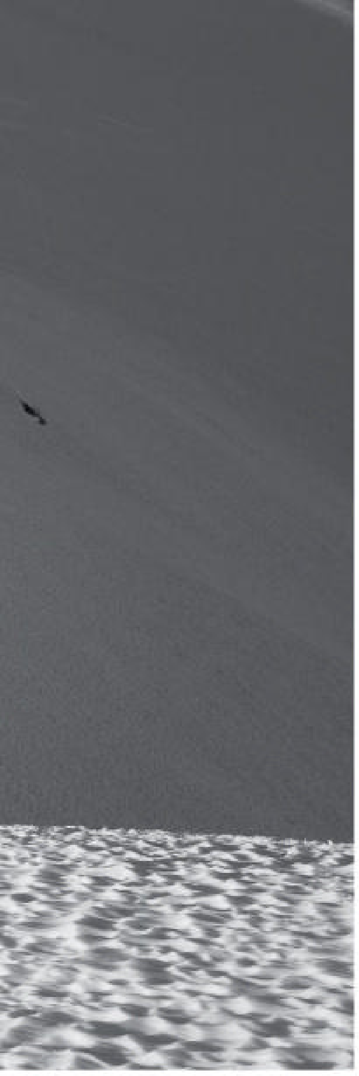
She picks up a small rock and rolls it in her hand. "Semi-rounded, freckled," she announces. Fabienne Meier, a student from Zurich, Switzerland, records the data in a waterproof yellow notebook, along with the rock's measurements in centimeters: 5.1, 7.7, 3.6. Watts sets the rock back where she found it, beside a patch of purple and yellow wildflowers, and picks up another one.

Watts and Meier are taking part in the Juneau Icefield Research Program (JIRP), the longest-running glacier research project in North America. In the 1940s, a team of explorers headed by pioneering glaciologist William B. Osgood Field Jr. began surveying the Juneau Icefield, a 1,500-square-mile expanse of ice, snow and rock straddling the border between Southeast Alaska and British Columbia. One of Field's mentees, Maynard Miller, founded JIRP and led it for more than half a century.

Today, the unique expedition is run by the University of Maine, with support from the University of Alaska Southeast. The 30 to 40 students who come each year from all over the world are mostly undergrads, though high school and graduate students can be found in the mix.

At the beginning of each summer, the JIRP attendees arrive in Juneau, where they learn high alpine travel skills and do team building exercises. After a week, they hike from sea level onto the edge of the icefield at 4,500 feet. Every 10 to 14 days, they move to a new camp by foot or skis.

On this particular day, the students are collecting data above the shimmering compound of metal-clad buildings that make up Camp 10.



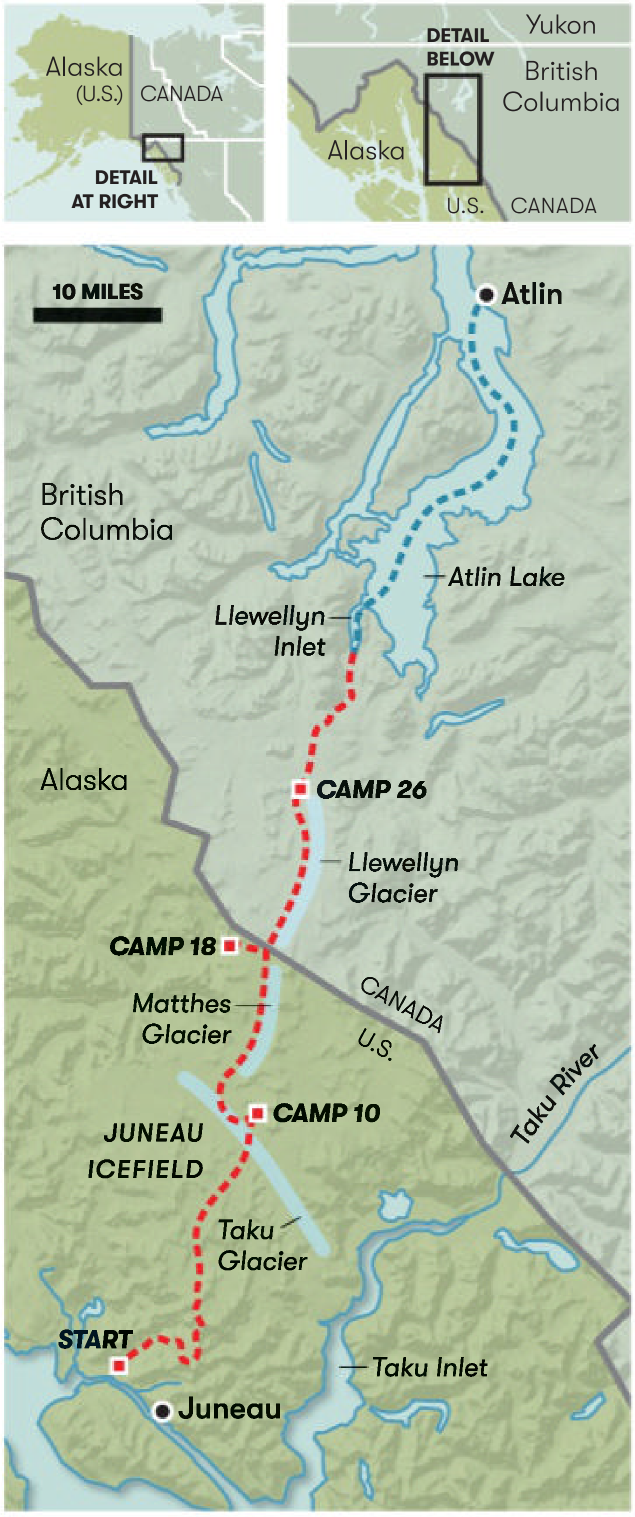
Beyond the camp is the white expanse of the upper Taku and Matthes Glaciers. The students wear thin layers with long sleeves and hoods, their faces pale with zinc to protect them from the summer sun.

The hum of a drone grows quieter as it moves uphill. Faculty member Bethan Davies, a glaciologist from Newcastle University in England, acts as spotter while Camryn Kluetmeier, a recent college graduate from Madison, Wisconsin, controls the drone using an app on a smartphone.

At the top of a nearby boulder, Anna Fatta, a student from Parkersburg, West Virginia, uses a rubber-headed mallet and a chisel to chip small flakes of granite. This boulder was dragged here by a glacier thousands of years ago. The friction between ice and bedrock smoothed the rock's edges.

When Education Is an Adventure

The group's 75-mile, two-month journey


Alaska
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Atlin
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Atlin Lake
Llewellyn
Inlet
Alaska
CAMP 26
Llewellyn
Glacier
CAMP 18
CANADA
U.S.
Matthes
Glacier
CAMP 10
Taku River
JUNEAU
ICEFIELD
Taku
Glacier
START
Taku Inlet
Juneau

MAP: GUILBERT GATES

Left to right, students Megan Stewart and Anna Fatta collect samples and make measurements while Ali Dibble listens to instructor Bethan Davies.

DIBBS
DIBBLE

Dibble packs up her sleeping bag after spending the night on the roof of a Thiokol Snowcat. The camps have bunkhouses, but participants can opt to sleep outdoors.

Two other students collect stray chips of granite from the ground. The samples will be sent to a lab for cosmogenic nuclide analysis, a process that can date how long a rock has been exposed to the atmosphere without being covered by ice. One of the students labels the bag of granite chips with the site location and the date: Taku A, July 3, 2022.

GLACIERS ARE MASSIVE BODIES of perennial ice, snow and sediment that cover about 11 percent of the land on earth. When a glacier is heavy enough, it slides slowly downhill, picking up sediment and reshaping the landscape as it moves.

When Miller began his research in the 1940s, he was especially intrigued by the Taku Glacier, one of the largest glaciers on the Juneau Icefield. After 1750, most glaciers in Alaska started thinning and retreating. But by the 1890s, the Taku was moving forward again, even while other glaciers around it continued to shrink and retreat. “How can the advance of the Taku be explained?” wondered Field and Miller in a 1950 article.

JIRP set out to answer that question. Until then, no one in North America had collected decades of ongoing data about a glacier’s mass balance—that is, the difference between how much melts or evaporates and how much accumulates from snow, ice and freezing rain. Now, measurements from JIRP are helping geophysicists understand why the Taku might be following such a different trend from other glaciers on the same icefield.

One explanation, proposed in a 2020 paper, has to do with the Taku’s structure. Compared with its neighbors, the Taku has more of its mass at elevations above 5,000 feet. Its highest point is about 7,000 feet above sea level. Temperatures are colder up there, which means a larger portion of the glacier can resist melting throughout the year. It also helps that the Taku Glacier has built up a thick sediment shoal on its front end, which buffers it from warmer tidewaters.

The Taku finally started a sustained trend of shrinking and retreating around 2019. The climate has warmed so much that the snowline—where snow accumulation balances out melting and evaporation—is getting higher on the glacier.

Christopher McNeil, the lead author of the 2020 paper, participated in JIRP as a student in 2009. Today he’s an Alaska-based geophysicist for the U.S. Geological Survey. His team goes out and takes its own annual measurements, but the glaciers they study are much smaller than the Taku. The adjacent Lemon Creek Glacier, for instance, is less than four square miles, and even that is a major hassle for a small team to monitor.

Clothes and gear dry outside at Camp 17. In the absence of running water, participants use melted snow for laundry and bathing.

Vijay Jain climbs toward Nugget Ridge as his party leaves the Lemon Creek Glacier. Junior staff member Jon Kaufmann checks their position via GPS.

Fabienne Meier jots down data about a large boulder. Scars and shapes offer clues about how glaciers moved across the landscape in the distant past.

SHUS

A team skis from the remote Taku D site to the Camp 10 sleeping quarters. Students often travel as much as 8 to 10 miles a day, carrying packs a third of their body weight.

"You have to carry your coring equipment and bring big metal poles to measure the snow and ice levels, your GPS, all that stuff—it's a ton of work," McNeil says. Collecting similar measurements of the Taku—a glacier with an area of about 280 square miles—would be out of the question for the few researchers on a typical expedition.

Yet because of JIRP, the Taku has the longest data records of any glacier in North America. "That can only be accomplished by the fact that we have this small army of students," he says. "They make it feasible." More than 1,000 reports and publications have come out of data gathered by JIRP participants.

Every week or two, a new group of instructors skis or helicopters into JIRP's camps to run research groups, give lectures and work one-on-one with students. Their expertise covers subjects such as mass balance, glacial dynamics, geology, isotopes, glacial bed mapping and the biology of the surrounding ecosystem. There are also sessions on visual arts, where students learn to slow down and really see the light, shadows, shapes and colors of the landscape in ways that can enrich their experience and inform their research. Many students carry journals where they make watercolors and contour drawings.

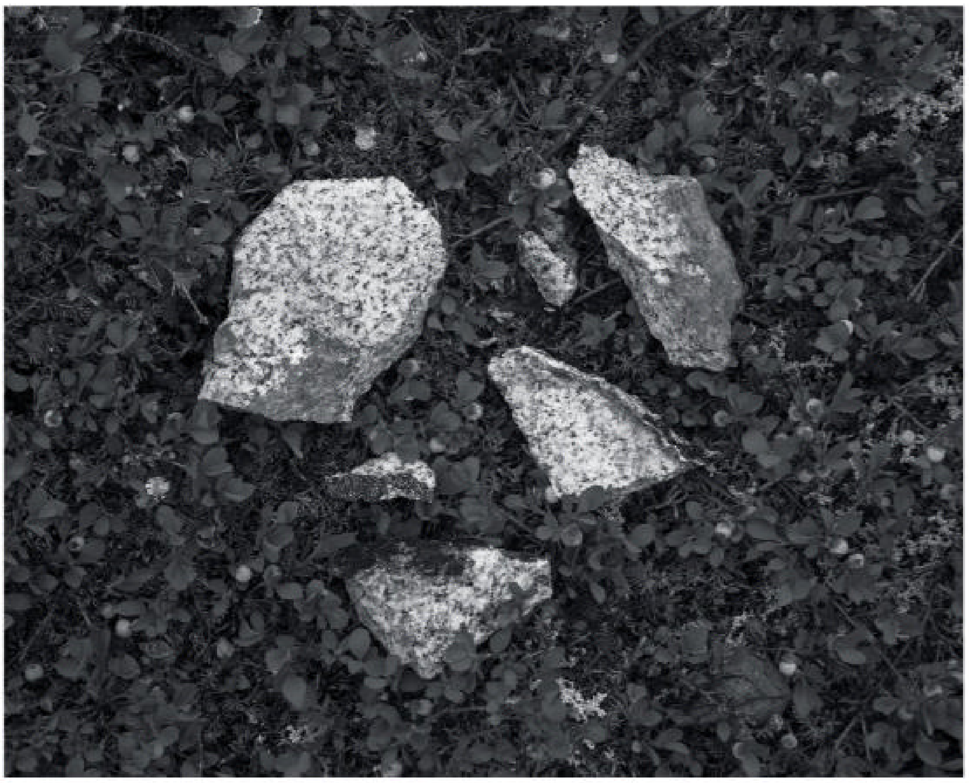
"I missed out on building relationships with professors at my home university," says Megan Stewart from Vancouver, British Columbia, who spent critical college time learning remotely because of the pandemic. "Eating meals, going on long skis, then attending lectures and fieldwork with the same faculty—I've really appreciated how unique an experience this is."

In a few days, the students working near Camp 10 will ski 18 miles north to Camp 18, the last permanent camp on the American side of the border. They'll leave behind the Taku Glacier and the vast white expanse of the icefield's interior for dramatic icefalls, crevasses and blue ice. Then they'll ski across the border into Canada for a short stay at Camp 26, maneuvering the slippery ice of the Llewellyn Glacier. Boats will bring them to the small mining town of Atlin, British Columbia, and a chartered bus will take them to Skagway, Alaska, where they'll catch the ferry back to Juneau.

By the time they head home, the students will know they've not only added to more than 75 years of research but also joined what McNeil calls the "scientific family tree" of mentors and students. "This lineage arguably extends back to John Muir," McNeil says, recalling the naturalist's 1879 voyage to Glacier Bay, where he explored Southeast Alaska with the help of Indigenous Tlingit guides. "And through me and my peers of today, the lineage is passed on to the scientists of tomorrow." ◆

At a site called Taku D, above the Taku Glacier, Dibble uses a rubber mallet and a chisel to chip away flakes from the boulder to send to a lab for sampling.

On the alpine tundra, chips of granite lie in a patch of blueberries—a convenient snack for hungry trekkers.



WAST

by **Rachael Moeller Gorman**

photographs by **David Degner**

Dairy farms like this one run by the Barstow family in Hadley, Massachusetts, make smart use of a substance cows produce in abundance.

E

TRADITION-MINDED FARMERS EMBRACE NEW TECHNOLOGY TO CONVERT MANURE AND FOOD SCRAPS INTO ELECTRICITY

NOT

The Connecticut River cuts between the Green Mountains of Vermont and the White Mountains of New Hampshire and rushes into the heart of Massachusetts, where Denise Barstow Manz stands in the wind, surveying the land her family has farmed for 217 years.

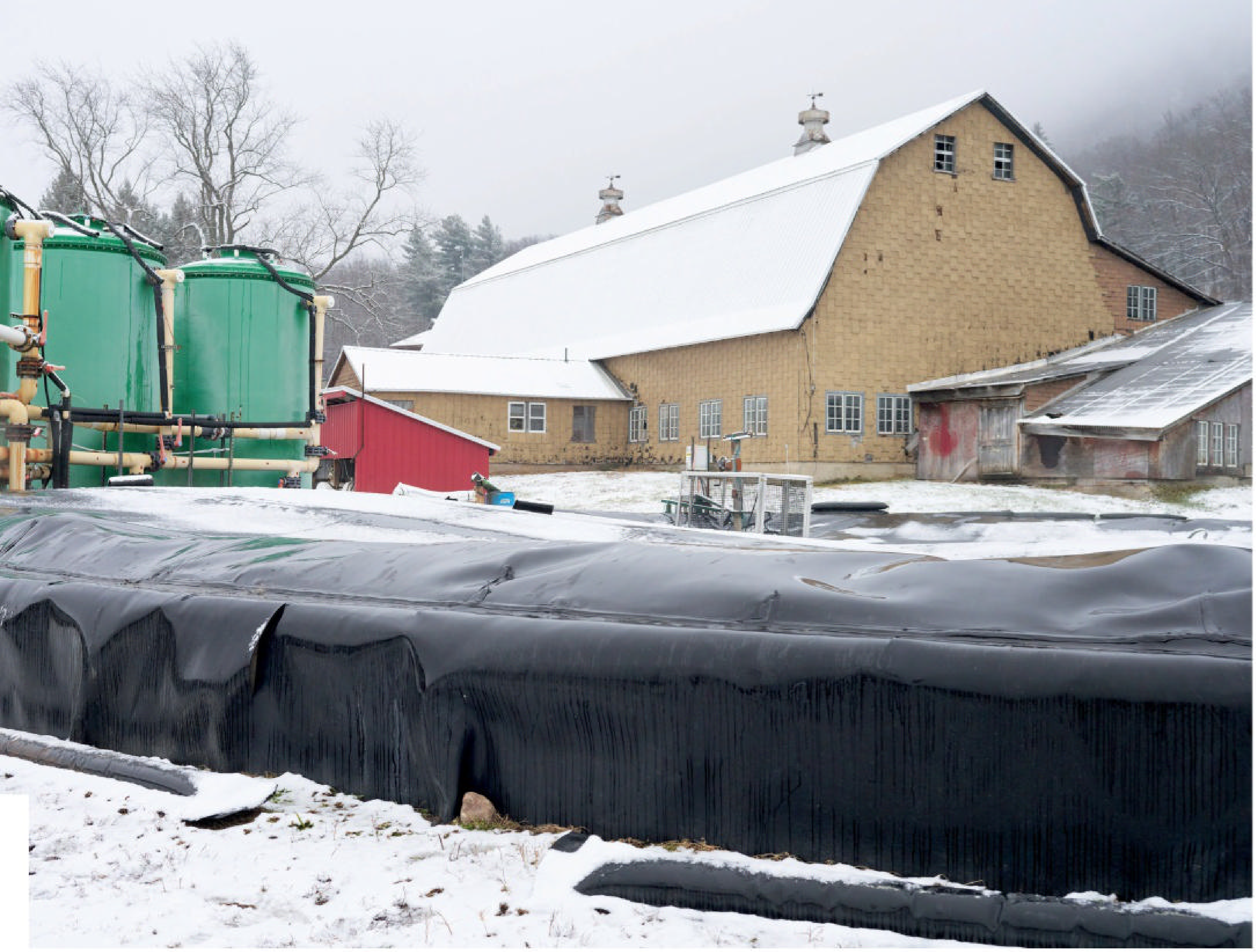
"We have some of the best soil in the entire world," says Barstow Manz. "It's called Hadley silt loam." She explains how the rich Connecticut River flood plain that's wedged between the river and the Mount Holyoke mountain range behind her nourished tobacco, asparagus, broom corn and squash for her 1800s ancestors, and how it now grows hay and corn for the current farm's 600 dairy cows.

Her dad, David Barstow, co-owns the farm with his brother, Steve Barstow, and his niece and nephew, Shannon and Steve II. David is "the director of special projects," his daughter teases. "Anytime we are doing anything that is unusual, which is almost always, Dad is in charge."

In the early 2000s, when the price of milk plummeted and dairy farms everywhere were trying to find a way to diversify, the Barstows began thinking about how to stay alive. They decided to take full advantage of an underutilized commodity the cows produced in abundance, and build something called an anaerobic digester—basically, a manure-fueled power plant.

It was a business decision that happened to have profound environmental consequences. Cows produce milk, but micro-organisms in one of their four stomach compartments also produce methane. They belch methane out of their mouths, and when mountains of manure pile up in oxygen-free lagoons or pits, the micro-organisms keep producing methane there, too.

Global climate policy hasn't focused as much on methane as carbon dioxide, partly because methane only stays in the atmosphere for about 12 years, while carbon dioxide lingers for centuries. But methane is many times more effective than carbon dioxide at warming the atmosphere, and its concentration has been rapidly increasing, according to the United Nations Environment Programme (UNEP). Interestingly, many measures for reducing methane have low operating costs or quickly pay for



The black-covered digester on the Barstow property, first installed in 2013, was later expanded by Vanguard Renewables.

Denise Barstow Manz and her father, David Barstow, are the seventh and sixth generations of dairy farmers in the family.

GRASS IMAGES: EKATERINA ARKHANGELSKAIA / DREAMSTIME

themselves. That's because captured methane can be used as power.

In front of the Barstows' cow barn sits a 550,000-gallon underground tank into which about 9,000 tons of manure flow from the cow barn each year. There, it's mixed in an oxygen-free environment heated to between 95 and 105 degrees Fahrenheit. Micro-organisms break down the organic material in the manure, and the machinery captures the biogas produced in the process. Pipes move the methane into one of two engines on the farm that burns it to create heat and electricity. This provides all the farm's heating needs. The organic matter left over after digestion is used as fertilizer on the fields, which has increased crop yields considerably. With the volatility of fertilizer prices since Russia's invasion of Ukraine, free fertilizer is a welcome cost savings.

"When you talk about sustainability, you have to talk about soil health and water quality and all of that, but you also have to talk about being able to make a profit," Barstow Manz says, pushing breeze-blown strands of hair back into her ponytail. A few cows lie on the field in front of the farm store chewing their cud. There's a steady wind stirring on that cloudy June day, and the chimes on the farm store tinkle. Yet the air blowing across the farm smells like . . . nothing.

The digester had turned all the manure into money.

THREE-AND-A-HALF BILLION years ago—when the Earth was a mess of crust and ocean—there was about 1,000 times as much methane in the air as there is today. Scientists think early micro-organisms helped warm the new planet by releasing methane as they went about their business. The sun was only 70 or 80 percent as bright back then, and the oceans should have been frozen. But some scientists believe that because of heat trapped by methane and other greenhouse gases, they weren't.

> **"If you want to tangibly REDUCE PEOPLE'S SUFFERING over the next 20 to 30 years, then methane is by far your most potent leverage to do that."**

Steve Barstow shovels manure, which will be moved into a chute, to be delivered to the anaerobic digester.

A methane molecule has one carbon atom surrounded by four hydrogen atoms. Desirée Plata, an environmental chemist at MIT, compares it to a person with four limbs. “There’s a lot of different ways they could move,” says Plata. “I like to say methane has great dance moves, so it’s got these vibrational and rotational modes, where its atoms are moving around the central atom.”

When ultraviolet and visible light waves reach the Earth’s surface, the ground absorbs them and sends the energy up as infrared radiation, or heat. The methane grabs onto that energy, says Plata, and keeps some of it trapped in the atmosphere. A molecule of carbon dioxide doesn’t absorb as much infrared radiation as methane. “Methane, molecule for molecule or pound for pound, is much better at absorbing that outgoing energy that’s trying to leave the Earth,” says Plata. “So a little bit of methane can do a lot of damage relative to CO_2.”

About a third of the methane emitted each year comes from natural sources, especially wetlands, which pump out megatons of methane. Methane-making bacteria also thrive in hydrothermal vents and hot springs. But the majority of methane emitted into the air today is generated by human activity. Oil, natural gas and coal-mining infrastructure contribute about 35 percent of human-caused methane emissions; human waste and landfills contribute another 20 percent.

Agriculture produces much of the rest. “We have seen essentially the number of livestock around the world inexorably go up for many, many decades by now,” says Drew Shindell, an earth scientist at Duke University and the chair of the Climate and Clean Air Coalition Scientific Advisory Panel coordinated by the UNEP. If nothing changes, human-caused methane emissions are expected to increase by more than 15 percent over 2010 levels by 2030.

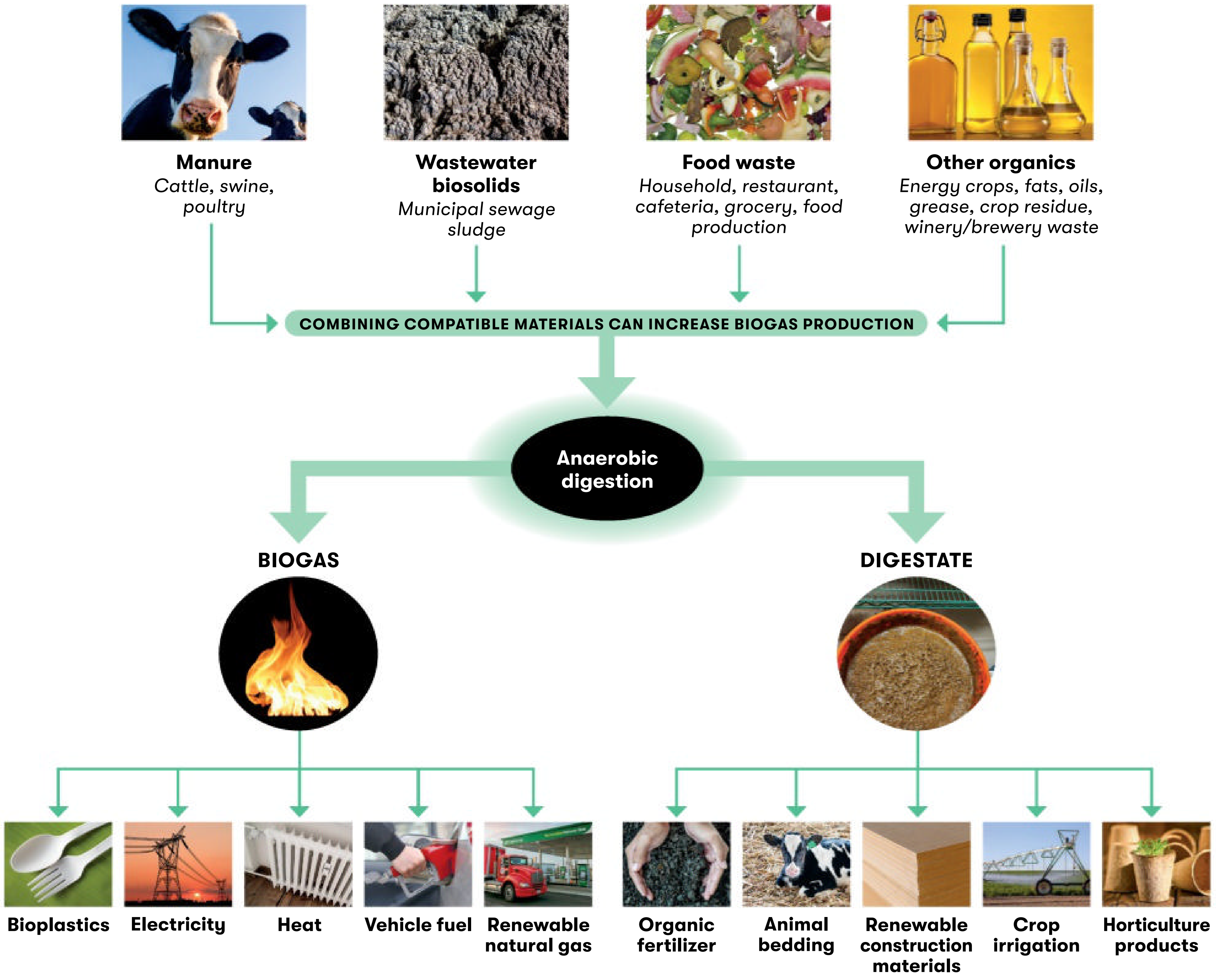
Since a lot of the methane humans are adding to the atmosphere comes from waste and leaky infrastructure, it’s easier to reduce than carbon dioxide, which is a byproduct of combustion in essential machines and power plants. And since methane only stays in the atmosphere for about 12 years, cutting it down will bring fast rewards. “If you want to tangibly reduce people’s suffering over the next 20 to 30 years, then methane is by far your most potent leverage to do that,” Shindell says, noting that fires, heat waves, floods and droughts are increasing at a faster rate than the climate scientists’ worst-case projections. On the ground, methane also oxidizes to form ozone, a respiratory hazard.

Shindell’s 2021 UNEP Global Methane Assessment showed that a combination of strategies—from better manure management to capturing gas escaping from the energy infrastructure—could reduce human-caused methane emissions by up to 45 percent. According to the UNEP report, that 45 percent reduction in human-caused methane emissions would “prevent 255,000 premature deaths, 775,000 asthma-related hospital visits, 73 billion hours of lost labour from extreme heat, and 26 million [metric tons] of crop losses” annually.

When it comes to agriculture, the methane from belching cows is difficult to eliminate unless consumers start eating less meat and drinking less milk. Methane from manure, though a

DON’T JUST THROW IT AWAY

The byproducts of various biological processes are increasingly being converted into useful materials


Manure
Cattle, swine, poultry
Wastewater biosolids
Municipal sewage sludge
Food waste
Household, restaurant, cafeteria, grocery, food production
Other organics
Energy crops, fats, oils, grease, crop residue, winery/brewery waste
COMBINING COMPATIBLE MATERIALS CAN INCREASE BIOGAS PRODUCTION
Anaerobic digestion
BIOGAS
DIGESTATE
Bioplastics
Electricity
Heat
Vehicle fuel
Renewable natural gas
Organic fertilizer
Animal bedding
Renewable construction materials
Crop irrigation
Horticulture products

DREAMSTIME IMAGES: LAURENT RENAULT, ALEX GRICHENKO, ALEKSANDRR VOLKOV, JEAN SCHWELZER, CHIDCHANOK RITTICHAISAMRAN, TEBNAD, MINO SURKALA, ISHTYGASHEV, BAPHOMETS, FAGIANELLA, IRINA PAPOYAN; SHUTTERSTOCK IMAGES: EKATERINA LIN, VINOD PILLAI; CORNELL CALS NUTRIENT MANAGEMENT SPEAR PROGRAM; COURTESY CLEAN ENERGY FUELS

much smaller portion of livestock emissions, can be reduced more effectively right now.

Anaerobic digesters can also tackle another problem: Americans throw out 30 to 40 percent of all the food we grow and make—as much as 80 million tons a year. Food waste is the largest category dumped in municipal landfills, and some states are running out of space. In 2014, Massachusetts—which now has fewer than ten active landfills, according to the Environmental Protection Agency—banned the dumping of food and other organic waste for institutions and businesses that produce one ton or more a week: grocery stores, food processors, wholesalers and large restaurants. Since November 2022, the ban has applied even to institutions that produce half a ton of organic waste.

Before the Massachusetts ban, there was only one small anaerobic digester in the state. By 2020, there were nine, five of them belonging to Vanguard Renewables. The company’s co-founder, John Hanselman, first laid eyes on anaerobic digesters in the early 2010s, when he went to Europe to examine solar panel technologies. “I kept seeing these domes. I said, ‘What are these things?’ And they said, ‘It’s an anaerobic digester. We take organic materials and cow manure and we make renewable energy.’”

When he got back to Boston, Hanselman decided to develop a new company, with colleague Kevin Chase, that focused on building digesters, but raising money was difficult. “Big energy investors were like, ‘Yeah, that doesn’t work, we don’t do that,’” he recalls. The United States did have some digesters, especially at wastewater treatment facilities and a few on farms, but the technology had never really taken off stateside.

As large companies like Unilever started talking about food waste and carbon footprints, Vanguard bought two existing manure digesters—including the Barstows’—which had been processing manure

BYLINES

Rachael Moeller Gorman is a Boston-based writer who focuses on science, health and the environment.

Photographer **David Degner** previously photographed old-growth forests in New England for *Smithsonian.*

FARM
POWERED

A digester at Goodrich Farm in Salisbury, Vermont. Each tank is covered with material that puffs into a dome as micro-organisms produce methane gas.

for a short time, and improved their capacity and efficiency. Then Vanguard built digesters on other farms. It also built a recycling facility in Agawam, Massachusetts, where companies or restaurants send food waste: pallets of packaged food, dozens of half-empty kegs of beer, mountains of boxed soup. An auger compactor and a hammer mill the size of a bus break food out of its packaging. The facility processes 100 tons of food per day, sending it to digesters to make power.

> “We are **DISRUPTING THE WASTE INDUSTRY**. For 400 years, this country picked up garbage and either put it in a hole and buried it, or burned it.”

In 2013, Vanguard started trucking more than 24,000 tons of food waste each year, from local companies, such as Cabot Creamery and HP Hood, to the Barstows’ farm. “Manure is really just food waste that’s been digested once,” says Patrick Serfass, executive director of the American Biogas Council. “So when you take food waste that hasn’t been digested at all, it has 10 to 35 times more energy in it.” Allocating just 10 percent of a digester’s volume to food waste doubles the biogas yield. “If we don’t recycle this food waste, it’s just going to be buried,” Serfass says.

Instead, the generator helps turn the local food and farming industries into a highly efficient loop. The crops on the Barstow farm hold the sun’s power, which cows eat to produce milk that Cabot Creamery uses to make butter. Cabot sends its food waste back to the Barstows’, and then buys some of the energy to help power its butter plant. Waste is squeezed for resources until it has nothing left to give. The digester sends more than 6,000 megawatt hours of electricity per year into the grid, enough to power 550 homes. The American Biogas Council estimates that at least 15,000 anaerobic digestion systems like this could be built across the country.

Vanguard won’t divulge how much money it’s making from

the energy it sells and the fees it collects from food companies. But it now has contracts with 130 farms across the country, with $800 million in projects in progress nationwide. It has tripled its employees in the past year.

"For 400 years, this country picked up garbage and either put it in a hole and buried it, or burned it. When people tried to do it before us, they ran right into a brick wall of an industry that didn't want to change," says Hanselman. "We try to price it so that we can get people to disrupt what they've been doing."

WHAT HAPPENS WHEN this approach is scaled up? Massachusetts has 9,500 dairy cows producing 200 million pounds of milk each year. In contrast, California, the largest producer of milk in the U.S., has 1.7 million dairy cows that produce 42 *billion* pounds of milk each year. Especially in the agricultural San Joaquin Valley, many farms are concentrated animal feeding operations, or CAFOs, with more than 700 dairy cows confined to a small area and manure frequently thrown into a pit or lagoon.

In 2016, the California legislature passed a bill requiring that the state reduce disposal of organic waste 75 percent from 2014 levels by 2025 and reduce methane emissions from dairy and livestock 40 percent from 2013 levels by 2030. The state started giving out more grant money to dairy digester projects, most of which went to three biogas companies that build on huge dairy farms. California allows gas produced by anaerobic digesters not just to be sold but

^ At a Vanguard facility in Agawam, Massachusetts, food waste moves through machines that separate it from packaging and turn it into a slurry.

< John Hanselman, co-founder of Vanguard Renewables, hopes to expand his company to include 100 digesters by 2026.

PRO LINE

A load of waste material from a milk company, delivered to Goodrich Farm, is poured into the hydrolyzer, the first step in the digestion process.

At Goodrich Farm, well-worn overalls hang on pipes that carry manure out of the cow barns. It is then separated into components for the anaerobic digesters.

also to generate credits when used for vehicle fuel. A digester in California can pay for itself in a little over three years, while dramatically reducing a CAFO's methane emissions.

Some environmental groups take issue with this. They acknowledge that digesters can help mitigate damage but worry that subsidies encourage CAFOs to keep polluting the air and water, overusing hormones and mistreating animals. They argue that the simplest way to reduce methane is to keep farms small and expose manure to the air. (When manure isn't put into a pit or lagoon, oxygen prevents methanogens from surviving.) Many environmentalists would also like to see people consuming less meat and dairy.

Hanselman, who calls himself "an old Sierra Club guy," has heard these complaints from friends. His retort: "Hey guys, you can ignore this or wish it away; they're not leaving. Let's attack the problem and try to work with the industry to create a solution that puts us as a country in a much better place."

"And it feels really good to know that we make enough electricity to power ALMOST EVERY HOME in this community."

Burning methane natural gas from the digesters also emits CO_2 as a byproduct, though a lot less than burning fuel oil or coal. And since CO_2 is a much weaker greenhouse gas than methane, burning the methane heats the Earth far less than letting it float into the atmosphere untouched. "Unfortunately, there is no replacement for natural gas that can possibly work in the next 20 years," says Hanselman. The methane filling the pipelines might as well come from non-fossil sources that actually cut down on emissions, he says, and be used alongside all the other sources of renewable energy. The results in California have been striking: Projects subsidized by California's digester grants will sequester as much greenhouse gas as removing almost 500,000 gas-powered cars from the road each year.

* * *

THIRD-GENERATION FARMER Danielle Goodrich Gingras walks past a humming, barn-red anaerobic digester on her way to visit the cows at her farm in Salisbury, Vermont. The sun is powerful on this early summer day, and the small, brand-new power plant shines. A Vanguard representative is there, too, and he explains that this plant came online in 2021 and is now the biggest anaerobic plant in the Northeast. The natural gas produced by its two 925,430-gallon digesters is purified on-site and fed into Vermont pipelines.

By partnering with Vanguard, farmers relieve themselves of the construction and operating burdens but still reap significant benefits. Their manure is handled in a way that reduces nutrient runoff into local watersheds, which is regulated by the state. Neighbors are happy, since there's little odor. The solid plant-fiber byproducts from the digester can be used as bedding for the cows (the price of sawdust keeps increasing), and the liquid digestate is rich in nitrogen, which makes it an excellent fertilizer. Farms receive a 20-year guaranteed lease payment from Vanguard, and some also receive credits from their energy providers.

Peter Melnik, a fourth-generation farmer in Deerfield, Massachusetts, partnered with Vanguard

CONTINUED ON PAGE 124

How communities in the West are boldly ***setting property ablaze*** *to reduce the impact of extreme wildfires*

UNDER CONTROL

photographs and text by

ANDRIA HAUTAMAKI

CREDIT TK HERE

Attending to a pile burn in Plumas County, California, Greg Kinne, an artist, belongs to a cooperative that helps landowners wield fire on private property.

CREDIT TK HERE

Saylor Flett, left, fans flames ignited by Jeff Greef. Air quality, weather and even bird migration affect when it’s safe to conduct a burn.

When the 2021 Dixie Fire barreled toward Jeff Greef’s Northern California cabin, he heeded the mandatory evacuation order, packed his truck and grimly drove away. In the days leading up to his departure, he had watched the sky darken with billowing clouds of smoke that made it feel like night. Greef, a former building inspector in the Bay Area, had recently retired and relocated to the picturesque Sierra Nevada. For the past few years he had vacationed on this land and used that time to gird against potential wildfires. He built his cabin with fire-resistant cement board siding and a metal roof. Following advice from the local fire safe council, he thinned his ten-acre forest. With the support of the landowner-led Plumas Underburn Cooperative, he completed an underburn, a prescribed fire to remove “duff,” a carpet of pine needles and other organic material that naturally accumulates on the forest floor.

A few days after Greef evacuated, the Dixie Fire engulfed nearby Greenville; intense flames reduced the historic gold rush town to ruins. Greef wouldn’t return home for several weeks.

The Plumas Underburn Cooperative and other Prescribed Burn Associations (PBAs) were founded on the belief that by sharing equipment and labor—and with proper training and experience—neighbors can man-

FLAME: FREEPIK

age fires together safely and effectively. First formed in the Great Plains in the mid-1990s, this collaborative model has since spread across the United States. In California, the first PBA was established in 2018; now, the state has 22. "Communities are desperate for solutions," says Lenya Quinn-Davidson, a fire expert with the University of California Cooperative Extension. "Many of the landowners and people involved want to restore fire to the system. They're inspired now, because they're seeing it happen in other places."

Fire has always played an important role in North American ecosystems. Before the arrival of European settlers, fires were frequent and often intentionally ignited by Indigenous people to reduce the risk of catastrophic wildfires and to nurture the land. In the eastern United States, these fires improved oak and chestnut tree growth. In the Great Plains, fires set by Native Americans crept across the prairie and maintained healthy grasslands that benefited ground-nesting birds and grazing animals. And in the Mountain West, fire cleared out dead trees and created patchworks of vegetation within the forest to act as natural firebreaks.

But in the early 1900s, U.S. strategy shifted to fire suppression. Federal and state land management agencies prohibited "light burning," an early term for prescribed fire. From the 1930s to the late 1970s, federal fire policy was guided by the "10 a.m. rule," which stipulated that fires should be suppressed by 10 a.m. the next day. With less controlled fire and a changing climate, communities have become increasingly vulnerable to high-intensity megafires. In 2021, the federal government

Reporting for this story was made possible by an award from the Institute for Journalism and Natural Resources.

FIRE HAS ALWAYS PLAYED AN IMPORTANT ROLE IN NORTH AMERICAN ECOSYSTEMS.

spent $4.4 billion on fire suppression, nearly double the $2.3 billion spent just a year earlier.

But now the winds are shifting on fire strategy once again, with state and federal agencies planning more prescribed burns. A trained professional, often called the "burn boss," plans and coordinates a controlled fire. Weather conditions must be just right. These low- and moderate-severity fires can improve the habitat for wildlife, pollinators and grazing animals; restore forest vitality; protect grasslands from encroaching trees; control noxious weeds; and reduce the buildup of hazardous fuel that can contribute to uncontrolled wildfires.

IT'S LATE OCTOBER in the rugged pine forests of Plumas County, and the morning is cool and damp. Mist still hangs in the crown of the trees as half a dozen members of the Plumas Underburn Cooperative, a California PBA, gather to conduct a "pile burn," a type of prescribed burn. Scattered across the steeply sloped hillside, piles of logs are thoughtfully stacked. In preparation for today's event, homeowner Saylor Flett thinned out small trees and trimmed the lower tree limbs that would be considered "ladder fuels." Flett also collected stray, downed branches and logs on his forested property and gathered them into piles.

One by one, the piles are lit with a drip torch,

PREVENTIVE MEASURES
"The focus on forming very local burn associations has to become the norm," says Bill Jacks, right, a member of the Plumas Underburn Cooperative in Northern California. Far right, tree-thinning as well as controlled fires reduce the fuel available to a wildfire and thus contribute to preserving mature trees.

and the volunteers, dressed in fire-resistant yellow Nomex clothing or natural-fiber long-sleeved shirts and pants, tend the crackling flames. In the background, easygoing guitar music from a portable speaker reverberates through the trees. Cooperative member Greg Kinne methodically rakes up needles, twigs and pine cones, which he adds to a sparking pile; today is his 70th birthday. "It seems to me that the smaller neighborhood actions are by far the best," Kinne says. "All the people around buy right in, because you've got common property, common problems. I really like the neighborhood approach."

By early afternoon, most of the burn piles have been reduced to smoldering ashes. Flett sets up a folding table in the woods and brings out hot pizza and cold drinks. It's a tradition for the landowner to provide a meal to thank the burn cooperative members for their effort and time. Later, they may conduct an underburn—another type of prescribed burn that creeps across a forest floor to remove excess vegetation without harming mature trees.

More than a 200-mile drive away, in the rolling oak savanna and rugged chaparral rangeland of coastal California—a distinctly different landscape from the Sierra Nevada—prescribed burning can also be an important tool. A few days after a heavy fall rainstorm, I join Mendocino County rancher and volunteer firefighter Kyle Farmer at Magruder Ranch

“IF A WILDFIRE DOES COME THROUGH, MY KIDS ARE GOING TO HAVE A BEAUTIFUL PLACE WITH OLD OAK TREES.”

In Mendocino County, California, Kyle Farmer, a rancher, works with a local burn cooperative to promote a healthy environment, sustain wildlife and conserve land for future generations, including his daughter, June, 7.

along with his wife, Grace, and their children, June, 7, and Walter, 5. Following the lead of his father-in-law, who long embraced prescribed fire, Farmer uses the practice to help sustain the family’s grass-fed cattle and lamb operation, now in its sixth generation.

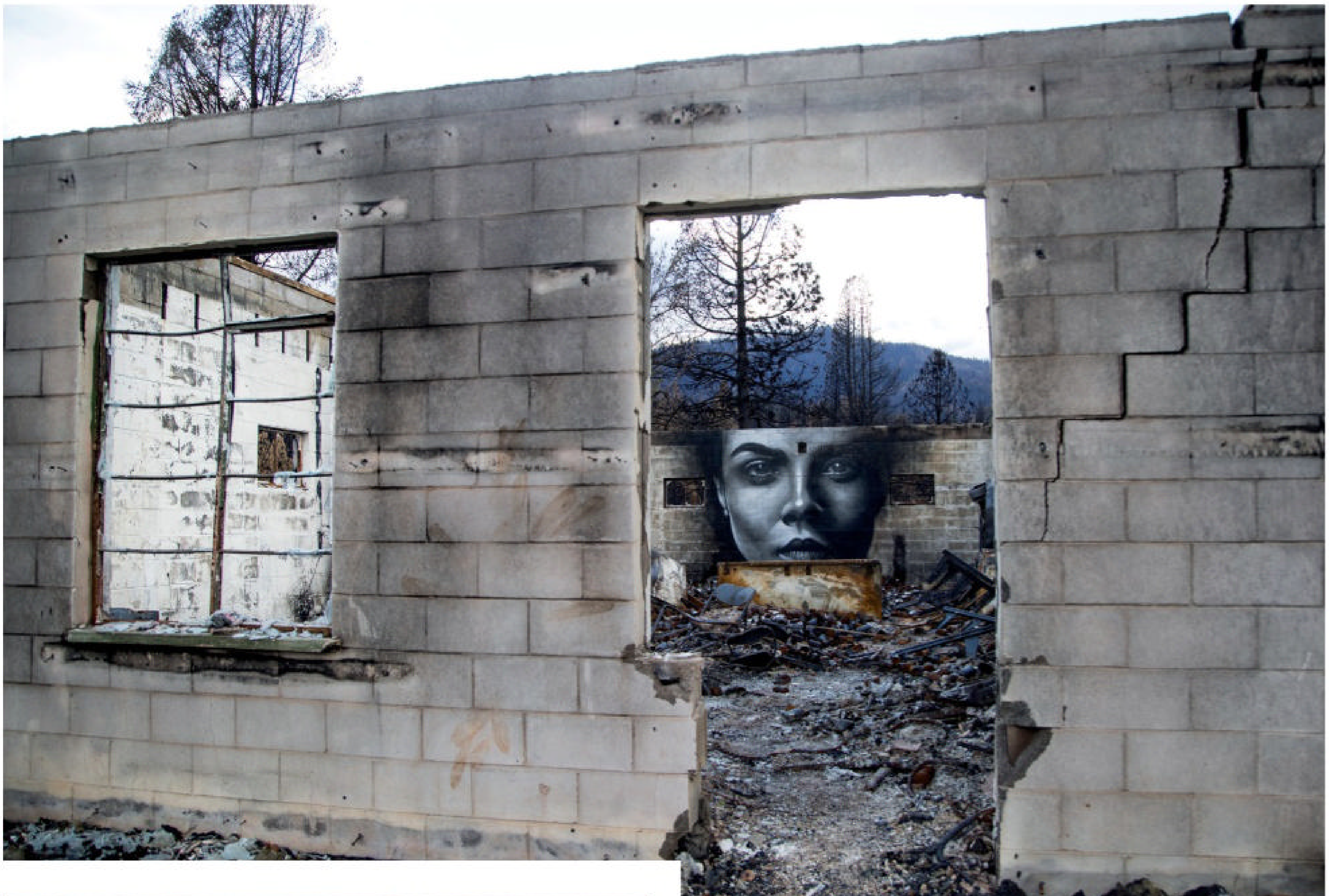
We buckle into an all-terrain vehicle, and Farmer drives us through the oak savanna before climbing past madrone forests with red, papery bark. As we reach the top of a ridgeline, Farmer, who is also a founding member of the Mendocino County PBA, stops at the edge of the hillside; black lines from previous prescribed burns are etched into the slope below. “We’ve introduced a mosaic into all the brush on our land, which is going to change how it burns,” he explains. Strategically applying patches of prescribed fire creates a checkerboard pattern that encourages plant and animal variety. Wildlife, such as black-tailed deer and tule elk, also benefit from improved grazing after fire removes old underbrush, allowing new sprigs of vegetation to freely emerge.

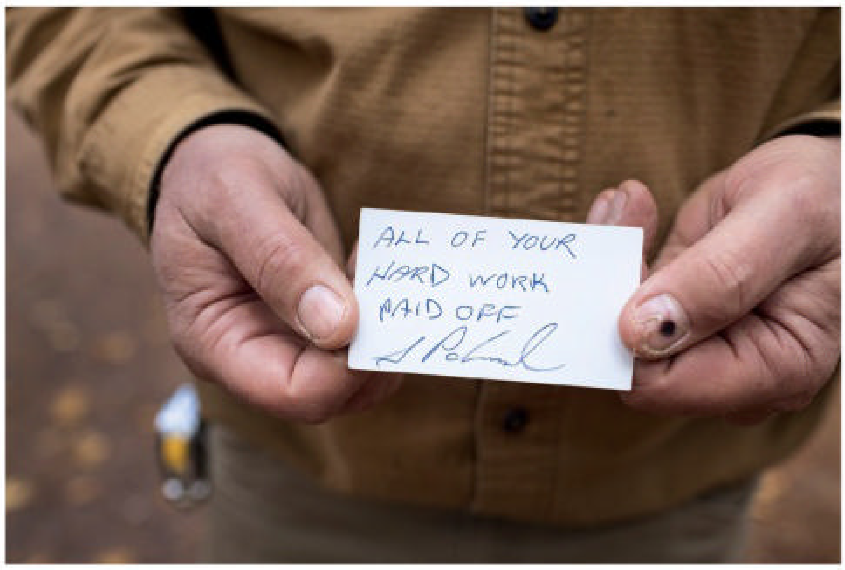
In 2017, Magruder Ranch lost 45 pregnant cows during the Redwood Complex Fire, when flames fanned by downhill winds overtook the fleeing herd. Farmer now takes topography and fencing materials into account to maximize the livestock’s potential escape routes in the event of a wildfire. And, eager to avoid future “dozer lines” from heavy machinery scraping away topsoil to create fire containment lines, he pre-emptively uses prescribed fire to clear the land of thick underbrush and other fuels. “If a wildfire does come through, my kids are going to have a beautiful place with old oak trees,” Farmer says. “They will get the chance to take care of the land instead of being handed a problem.”

Historically, most homes in Mendocino’s Potter Valley, including Magruder Ranch, were built on the valley floor or in the lower foothills. But now, recently constructed houses dot the ridgelines amid the chaparral. These homes

BYLINES

Based in Chile, writer and photographer **Andria Hautamaki** focuses on the intersection of the environment, agriculture and rural life.





NEW BEGINNINGS After the Dixie Fire devastated most of Greenville in 2021, artist Shane Grammer offered hope to residents by painting murals throughout the town, including the one above, on the ruins of a food pantry. Jeff Greef returned home to find a congratulatory note from the fire unit chief on the front door of his red-roofed cabin, right. The green, surviving trees around the house mark the area where Greef, working with a cooperative, had conducted an underburn.

are part of a larger trend toward a progressively fragmented landscape that makes it harder to both perform controlled burns and save vulnerable structures in the event of a wildfire.

Federal and state fire agencies alone can't meet the growing need for prescribed fire. Local burn associations, Native American tribes, fire safe councils and programs like Firewise USA—a guide for residents on how to reduce wildfire risks in their own neighborhoods—can help bridge the gap. In California, between 10 million and 30 million acres could benefit from restoration thinning or prescribed fire. By 2025, the statewide goal is to treat one million acres a year, including a prescribed fire goal to burn 400,000 acres annually. "The idea that we can empower landowners and communities is huge, and the results are real," says Quinn-Davidson. "These grassroots efforts make a huge difference. People know their landscapes, they know their properties, and you can go out and start working on it today."

In total, the Dixie Fire burned for 103 days and grew to over 960,000 acres to become the second-largest wildfire in California history. The fire destroyed more than 1,300 structures, but Greef's house wasn't one of them. When he returned, his cabin was surrounded by a blackened, charred forest, but his home and outbuildings remained intact on a small island of earth surrounded by green trees. Tucked in the front door, he found a business card signed by a fire unit chief. On the back of the card, written in all caps, a message: "ALL OF YOUR HARD WORK PAID OFF." ◆

Out

A monk seal in southern Greece. Females tended to give birth on beaches before human hostility drove them into hiding.

HEROES OF THE WILD

# of the Shadows

An endangered Mediterranean seal known for its reclusive nature is being glimpsed again

photograph by

Bruno D'Amicis

THE MEDITERRANEAN MONK SEAL begins its life in a cave. Even after it grows to hunt and mate in open water, the seal sticks to its monkish ways. These retiring creatures—the only seal species in the Mediterranean region—are among the scarcest marine animals in the world, with a population around 800. About half can be found in Greek waters, where an island or inlet might be home to just a few monk seals.

Their ancestors were much more social. In *The Odyssey*, Homer described monk seals crowding together like a flock of sheep. The first-century Roman scholar Pliny the Elder wrote that the seals could be trained "to salute the public with their voice and at the same time with bowing." When the Alsatian naturalist Johann Hermann named the species "monk seal" in 1779, he was thinking less of the animal's behavior than its appearance, noting, "Its smooth round head resembled a human head covered by a hood."

After centuries of being hunted for fur and oil, monk seals grew both skittish and scarce. Until recently, the biggest threats were fishermen who saw the seals as competitors or nuisances. "They would go around the village saying, 'I killed a seal today,'" says Dimitris Tsiakalos, coordinator for the nonprofit Hellenic Society for the Study and Protection of the Monk Seal, a nonprofit widely known as MOm, after the species' Latin name, *Monachus monachus.* "This was something all fishermen used to do."

Such routine killings have become far less common since the late 1980s, when MOm began its work. The group mounts cameras in caves where pups are born and records civilian sightings. When someone calls them to report an orphaned pup, MOm staff members arrive and take the pup to its rehabilitation center in Athens. After a few months of care, volunteers load pups onto boats and release them in remote locations, where the seals' swimming and hunting instincts kick right in. By then, the pups weigh around 120 pounds or more, making them challenging to lift. "But they're pretty cooperative," Tsiakalos notes fondly. "They don't try to bite you."

In recent years, Mediterranean monk seals have rebounded sufficiently for the International Union for Conservation of Nature to bump up their status from "critically endangered" to "endangered." They're returning to places like Croatia and Albania, where they'd long been absent. On the Greek island of Samos, one seal called Argyro grew comfortable enough around people to recline on beach chairs and hang out at a café next to men playing backgammon. Argyro was shot in 2017, a sign that some still see seals as a nuisance. But her death sparked outrage throughout Greece, which shows how much the old attitudes have changed.

Tsiakalos was encouraged when MOm got a call from a fisherman who'd found a seal stranded by a storm and stayed up all night to keep it warm. "A fisherman!" Tsiakalos emphasizes. "There's been a real shift in the mind-set. And that's why seals are not so afraid of people anymore." –JENNIE ROTHENBERG GRITZ

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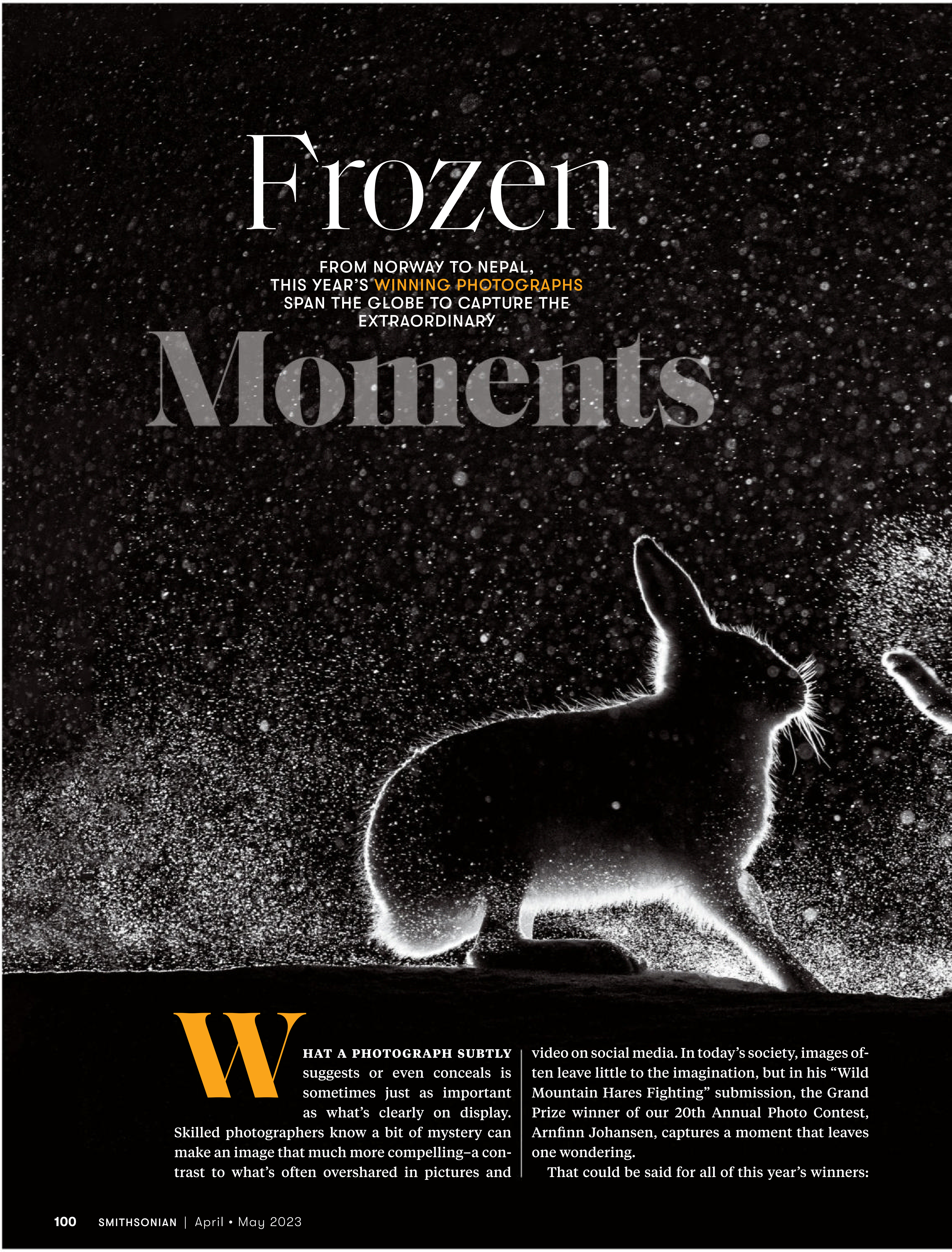


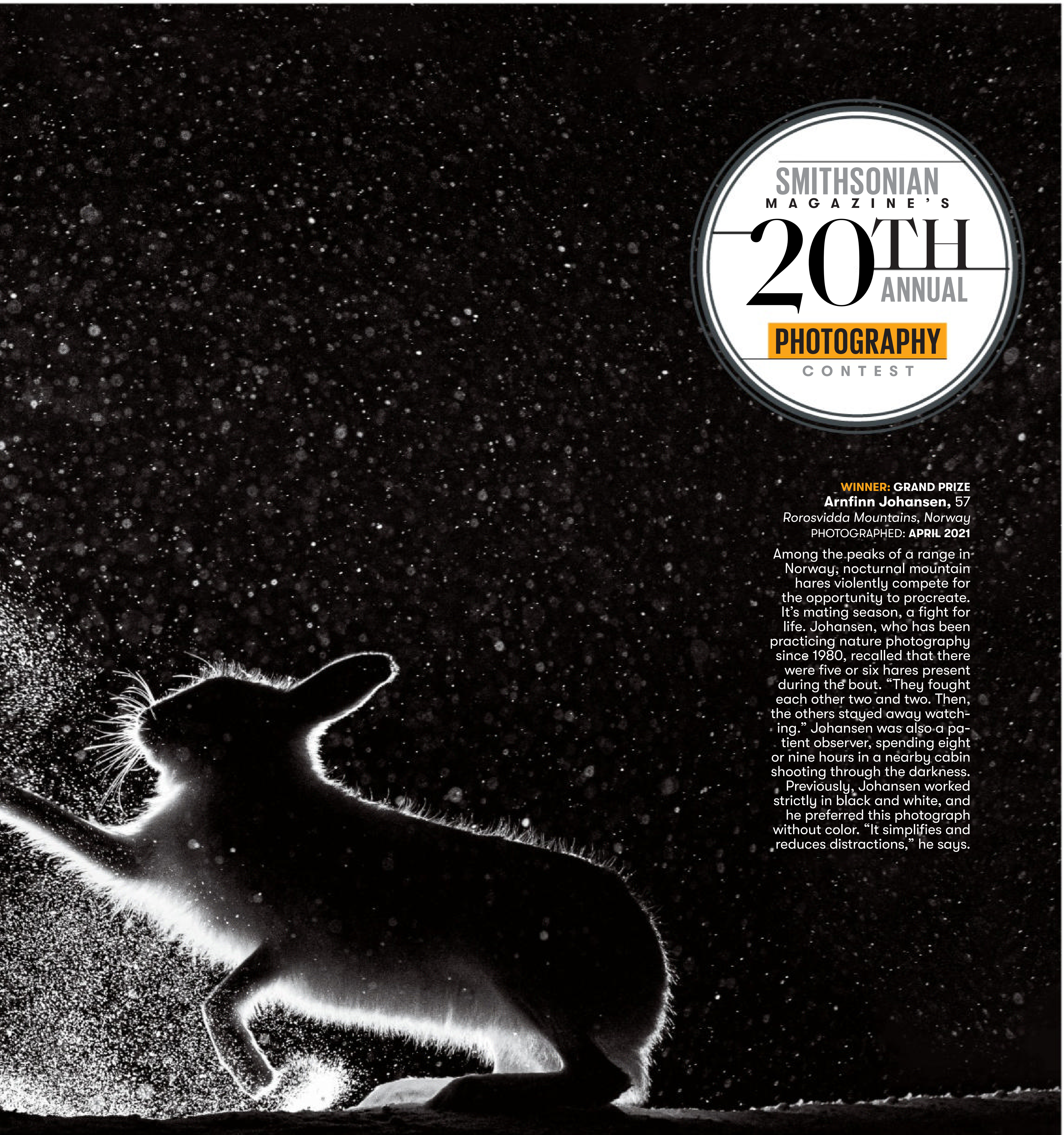
Frozen Moments

FROM NORWAY TO NEPAL, THIS YEAR'S WINNING PHOTOGRAPHS SPAN THE GLOBE TO CAPTURE THE EXTRAORDINARY

WHAT A PHOTOGRAPH SUBTLY suggests or even conceals is sometimes just as important as what's clearly on display. Skilled photographers know a bit of mystery can make an image that much more compelling–a contrast to what's often overshared in pictures and video on social media. In today's society, images often leave little to the imagination, but in his "Wild Mountain Hares Fighting" submission, the Grand Prize winner of our 20th Annual Photo Contest, Arnfinn Johansen, captures a moment that leaves one wondering.

That could be said for all of this year's winners:

SMITHSONIAN MAGAZINE'S 20TH ANNUAL PHOTOGRAPHY CONTEST



WINNER: GRAND PRIZE
Arnfinn Johansen, 57
Rorosvidda Mountains, Norway
PHOTOGRAPHED: **APRIL 2021**

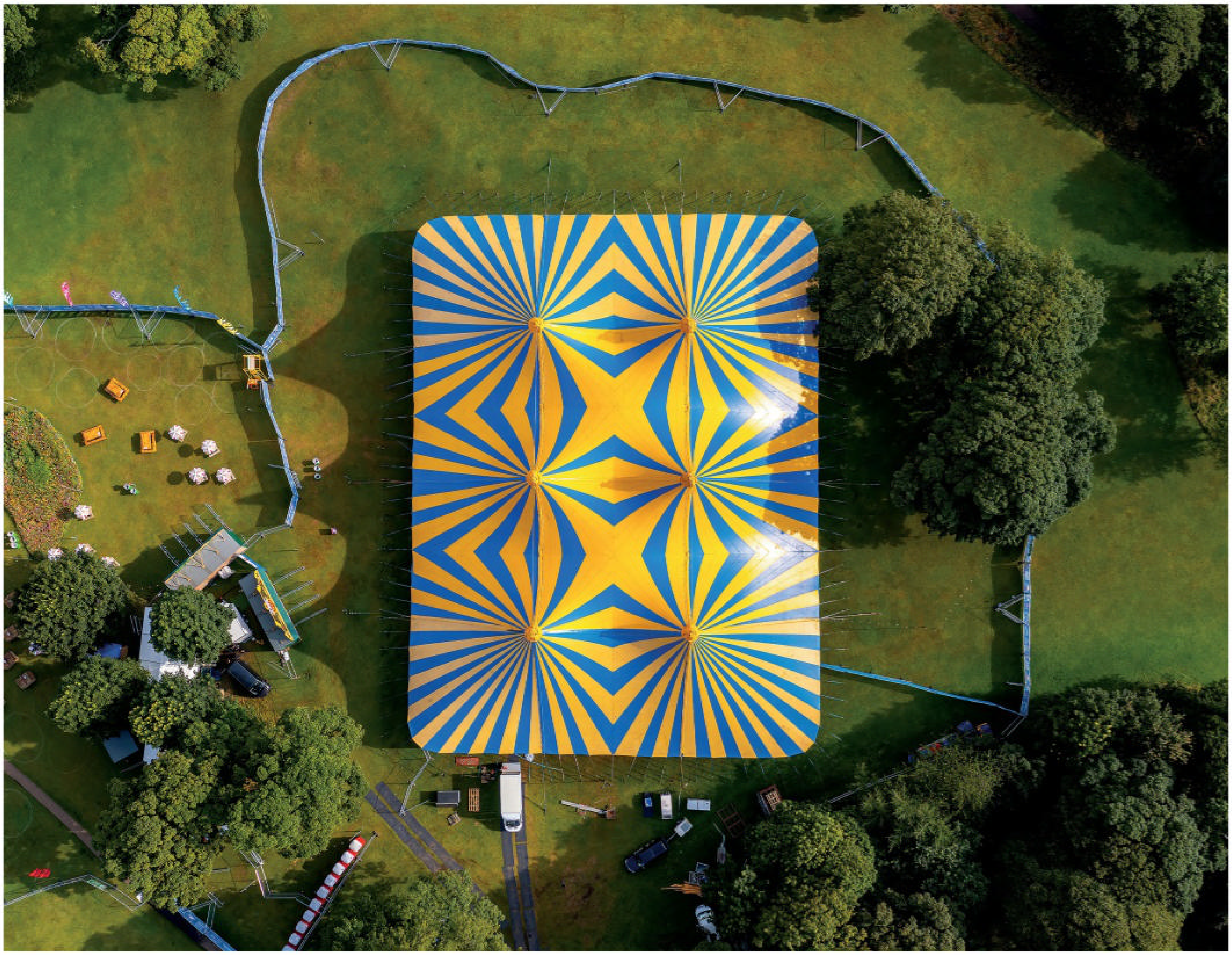
Among the peaks of a range in Norway, nocturnal mountain hares violently compete for the opportunity to procreate. It's mating season, a fight for life. Johansen, who has been practicing nature photography since 1980, recalled that there were five or six hares present during the bout. "They fought each other two and two. Then, the others stayed away watching." Johansen was also a patient observer, spending eight or nine hours in a nearby cabin shooting through the darkness. Previously, Johansen worked strictly in black and white, and he preferred this photograph without color. "It simplifies and reduces distractions," he says.

the obscured faces of mask-wearing girlfriends out on the town, a pair of rhinoceroses either running away or charging, a singular subject sitting in solitude in the darkness of dawn, and the shadowy silhouettes of figures hidden in plain sight. These are just some of the top scenes that offer just enough to stir emotions, pull viewers in and raise poignant questions, leaving it up to the beholders to interpret the art for themselves.

The diversity of this year's entries is fitting for the 20th anniversary of this annual competition, which has grown to include more than 32,690 images submitted by nearly 7,000 photographers from 190 countries and territories. —TRACY SCOTT FORSON

WINNER: AMERICAN EXPERIENCE ›
Rory Doyle, *39*
Atlanta
PHOTOGRAPHED: **NOVEMBER 2022**

On assignment for an Amsterdam newspaper to document the November 2022 midterm elections in the United States, Doyle headed out before sunrise and came across this lone citizen, who was quietly determined to exercise her fundamental right to vote. She arrived at her polling place even before it opened. "The narrative of the lack of care or the lack of participation gets more attention than people who are willing to literally bring a chair and a book before the sun is up," Doyle says.



WINNER: AERIAL
Andrew Smith, *42*
North Berwick, Scotland
PHOTOGRAPHED: **AUGUST 2021**

If you come across a big tent, it's natural to wonder what's happening inside. Smith, who has been photographing with drones since 2017, wondered what was on top of this colorful canopy in his hometown. Positioning his camera to point directly down on the tent, he was delighted and surprised by the symmetry and vibrant colors, says Smith, who appreciates photos that cause an instant reaction. "This was one of those moments for me. I think both the photographer and the viewer recognize it when they experience it. I don't think it can be qualified or deconstructed. I think you just need to feel it."

WINNER: PEOPLE ›
Jonny Dub, *42*
Tokyo
PHOTOGRAPHED: **OCTOBER 2022**

"Who are these gnarly girls?" That's one question Dub would expect viewers to ask when they see the ski-mask-covered, pink-hued candy consumers he encountered in Tokyo's Shibuya district last Halloween. Dub, who learned the basics of the art as a teen while assisting his father, an advertising photographer, says this picture, snapped before the women realized he was photographing them, was the most authentic of the bunch. He likes that this scene allows people to imagine a story of their own, one that "leaves the viewer wanting to know more about the characters and fills them with a sense of intrigue."

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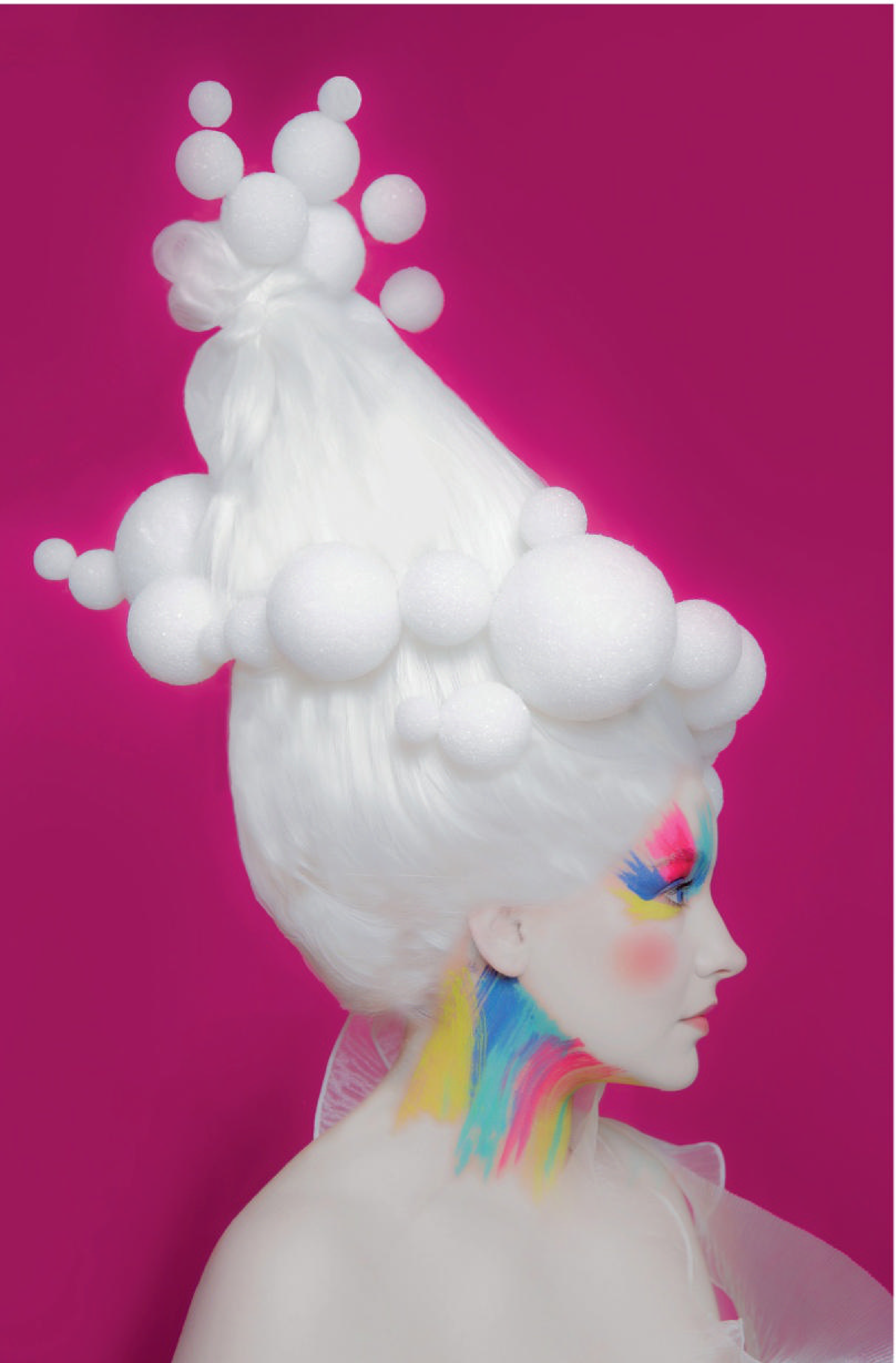
WINNER: ARTISTIC
Tracy Whiteside, *63*
Elburn, Illinois
PHOTOGRAPHED: **JUNE 2022**

Whiteside, a former musical theater teacher, knows how to bring drama to works on and off the stage. In her home studio, using just Styrofoam balls, a cone, hairpins, lots of spray, a blond wig, makeup and a pink tablecloth, she created this fanciful portrait of her grandchildren's nanny. Whiteside prefers profiles with little expression, which she finds more artistic than a smile. Still, says Whiteside, who has 20 years of photography experience, "I just want people to appreciate the fun in it."

SEE ALL 60 FINALISTS *and enter your own images in the next competition at* ***Smithsonianmag.com/photocontest***



WINNER: NATURAL WORLD
Prabir Kumar Das, *46*
Assam, India
PHOTOGRAPHED: **JULY 2021**

It was like a scene from *Jurassic Park*—but with raging rhinoceroses instead of a *Tyrannosaurus*. Das and his driver were on safari in a vehicle at Kaziranga National Park in India observing and photographing wildlife. "Two rhinos, chasing one another, entered into the frame," he recalls. "They both were coming toward our car dangerously." The driver threw the car into reverse to get away. Das, a chemistry teacher, is willing to take risks for his photography hobby, which has become his passion. He now focuses on wildlife and prefers Kaziranga National Park for "its natural beauty along with its exceptional ambience."

WINNER: TRAVEL
Annemarie Jung, *51*
Chitwan, Nepal
PHOTOGRAPHED: **OCTOBER 2022**

Jung, who lives in Luxembourg, traveled to Nepal during festival season on a last-minute trip before starting a new job in the finance industry last fall. Her newly developed enthusiasm for photography was a surprise. "I considered myself the least creative person on earth," she says. For this winning photograph, Jung and her guide arrived too late to the festival to see the Nepalese dancers perform. However, they provided an encore for the duo, whose photography session drew a crowd of interested villagers and revelers. "They all gathered around us and wanted to see the pictures we were taking. It was lovely," said Jung, who didn't mind lying down in the grass to get the best shot. ◆

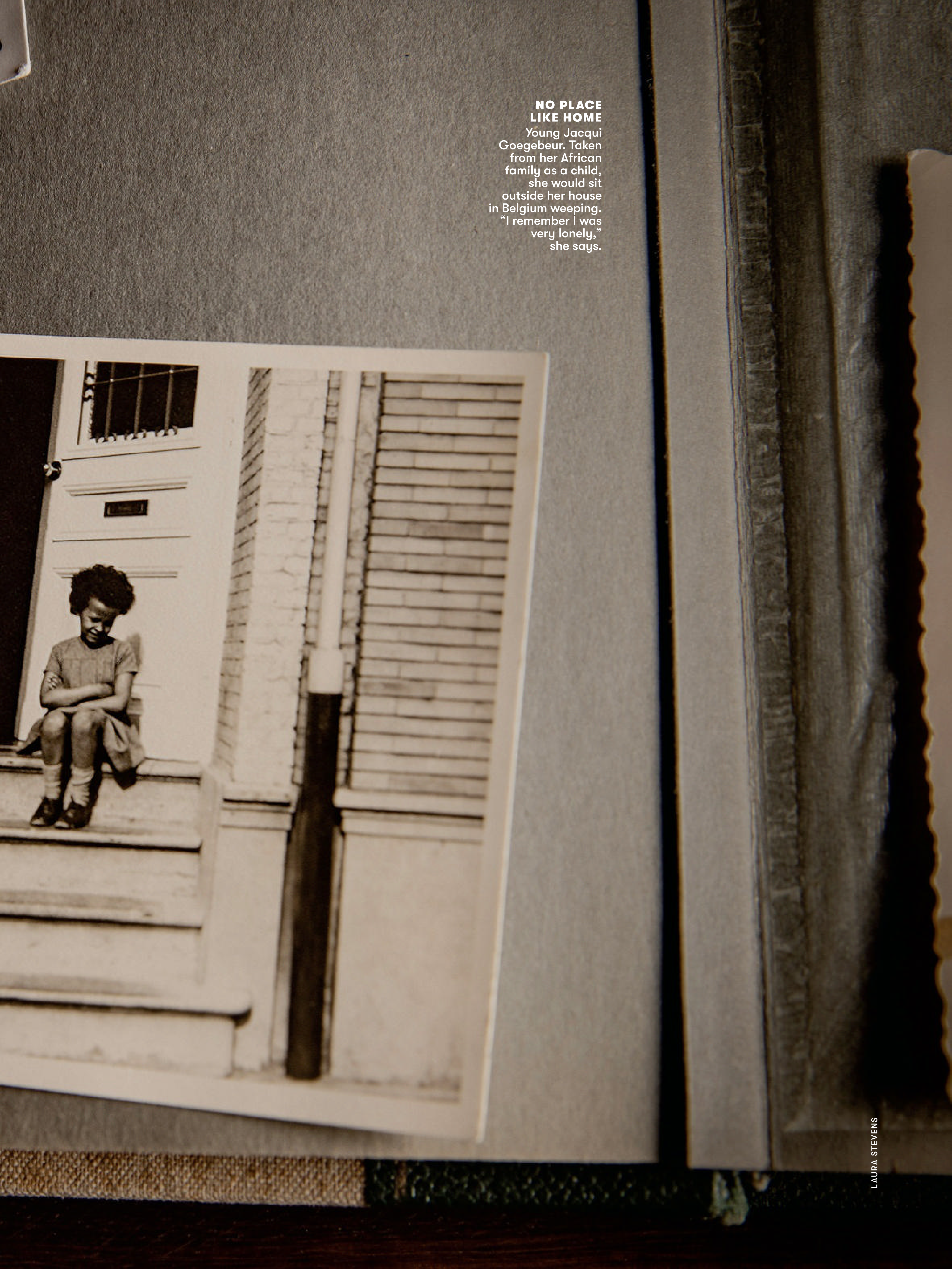
SHATTERED

The Youngest Victims of Belgian Rule

by **JOCELYN C. ZUCKERMAN**

In its African colonies, Belgium forced thousands of mixed-race children into orphanages. Decades later, they are still seeking justice

photographs by **LAURA STEVENS** *and* **THOMAS FRETEUR**



NO PLACE LIKE HOME Young Jacqui Goegebeur. Taken from her African family as a child, she would sit outside her house in Belgium weeping. “I remember I was very lonely,” she says.

LAURA STEVENS

The atrocities sanctioned by King Leopold II in the Congo, starting in the 1880s, reverberated for decades after his reign.

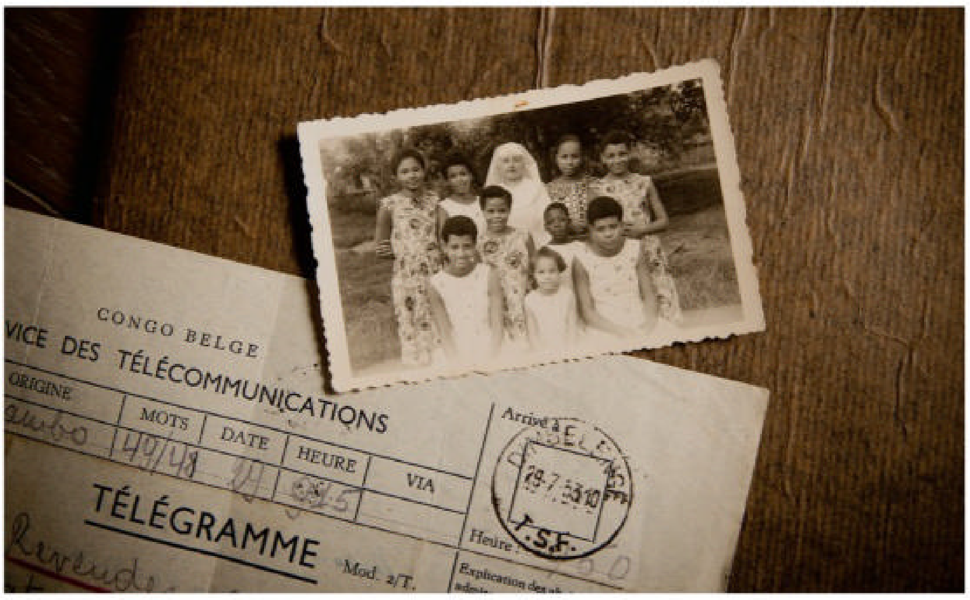
The criminal abuse that King Leopold II of Belgium notoriously visited upon the people of the Congo River Basin, beginning with his illicit appropriation in the 1880s of the vast territory he called the Congo Free State, did not end after he ceded control of the colony to the Belgian Parliament in 1908. For many more decades, brutal apartheid existed in the Belgian Congo and adjacent colonies—Belgium also gained the territory known as Ruanda-Urundi, corresponding to the present-day republics of Rwanda and Burundi—and this forced segregation gave rise to an especially heinous policy that is only now coming fully into view.

Marriage between white and Black people was made impossible by colonial administrators. Children of mixed-race parentage were not officially recognized by the state, which depended upon clear hierarchies and distinctions of race. While those who had been acknowledged by their European fathers or mothers were allowed to live with their families, the disavowed children were registered as members of the "civilized native population," placing them under the guardianship of the state. The children were taken young, in some cases as soon as they could go to the bathroom on their own. African parents who refused to release their toddlers were threatened with reprisals, including jail time. Many of the abducted children would never see either parent again. Estimates vary, but the number of young people affected by this colonial policy, which officially ended in the 1960s, is certainly in the many thousands.

Monique Bitu Bingi remembers all too clearly the final time the tall white man showed up in her village. The year was 1953, and she was living with her mother, grandparents, aunts and uncles in a scattering of mud-and-thatch huts in the Kasai region of what was then the Belgian Congo. They had all seen the man before; he showed up periodically to check on the cotton plantings that each household was required to cultivate. On this occasion, he spoke with one of her uncles, and later on, back at her grandparents' hut, the 4-year-old noticed that a grim mood had descended over the grown-ups. She lay down to sleep beside her grandmother, her mother having disappeared from the compound.

The next thing Bitu Bingi remembers is waking by a large river. Her uncle helped her into a long, narrow canoe. After she and her grandmother, aunt and uncle disembarked on the opposite shore, the four of them walked for three days, the adults taking turns carrying little Monique. At night, they bedded down in huts that villagers had built for storing cotton. Eventually they came to a hospital, where the tall Belgian stood waiting by his truck. Some men lifted a cot holding a lifeless child into the back of it, and

Right, Monique Bitu Bingi. She was taken from her family as a girl and placed with nuns at the Katende mission, below. The telegram announces the arrival of more children at the mission.



MAP: ANTIQUA PRINT GALLERY / ALAMY STOCK PHOTO; LOOK AND LEARN / BRIDGEMAN IMAGES; LAURA STEVENS (2)

her aunt and uncle climbed up, too, settling in amid the bales of cotton. Bitu Bingi and her grandmother were instructed to sit up front.

She recalls waking a second time in the middle of a festival, surrounded by a crowd of people dancing. It must have been a Wednesday; that was the traditional day for a wedding. She searched the faces of the revelers but didn't recognize a soul. Eventually, a girl a few years older than she approached, holding a mango in her outstretched hand. Taking young Monique by the arm, she led her to a place where women in long, white dresses, with billowing white fabric framing their pale faces, wandered among large buildings. A clutch of girls with brown skin similar to Bitu Bingi's own began to gather around her. "It was another world," she said. "I was somewhere else, and I didn't know anyone."

■

IT IS ONLY RECENTLY that Bitu Bingi and others of mixed race—who were known as "*mulâtres*," from the Latin word *mulus* (the offspring of a horse and a donkey)—have begun to speak publicly about how they were abducted from their homes as toddlers and installed in religious schools by the Belgian state. I first learned about these injustices in the course of my reporting on the palm oil industry for a recent book. The commodity was central to the economy of the Congo under colonial rule, and the same racist mind-set underpinned the cultivation of the oil palm crop, which relied on forced labor.

Like Bitu Bingi, Simone Ngalula was taken to Katende mission, arriving in 1952 when she was just 3. Léa Tavares Mujinga, around 10 years old at the time, remembers well when Ngalula was dropped off with her two brothers by their grandfather. The siblings' Belgian dad had been sent back home by the government, and her Congolese mother had been told that her husband had died. "I grew up thinking my father was dead," Ngalula said. "They told us that our father was the state, Papa l'État."

Tavares Mujinga was not yet 3 years old when she was taken to Katende. However, in 1953, as one of the oldest of the 20 or so *métisses*—the term used today to describe these mixed-race girls—she was charged with helping take care of the new kids. I met with both women in Tavares Mujinga's home, located in a modest housing complex in Brussels. Tavares Mujinga, 79, recalled how she'd seen the sisters of St. Vincent de Paul take the girls' shoes and socks, as they had done with other new arrivals, and issue them simple dresses in a rough fabric. (*Métis* boys were overseen by priests in a separate facility.) Meals consisted of sweet potato greens and the cassava mush known as fufu. Tavares Mujinga still bears scars on her legs from the ulcers that resulted from the lack of vitamins in her diet. A square-shaped recess on her forehead memorializes a particularly forceful smack from a nun she received when she was 5.

Each girl was given a single blanket and slept on a thin mat. Bitu Bingi's was located next to a door, on the other side of which was a morgue. (That explained the tiny, still body that had been loaded onto the truck that day she'd been dropped off.) Once a week, the girls bathed in a river. Only to and from church on Sundays and at Christmas and Easter—or when one of the state agents was scheduled to come by to pay the nuns—were they issued socks and shoes.

When the nuns ran out of drinking water, even if late at night, the girls would be summoned to walk the three miles to the river, balancing sloshing five-gallon pots on their heads for the duration of the return trek. Among their other tasks was taking care of the infants in the adjacent nursery, which the nuns had established in response to the many local women who died in childbirth. The girls would wash, change and feed the babies every morning, afternoon and evening, running to attend classes in between. None of the métisse girls had been baptized, nor were they invited to receive communion. "We were told we were 'the children of sin,'" Bitu Bingi said. "The sisters, the population, everyone called us that."

■

IN JUNE 1960, the Belgian Congo was granted independence, but factional fighting had already begun to break out in the countryside. Toward the end of that year, a minibus pulled into the Katende compound, and the girls, having overheard talk of the worrisome political situation, assumed they were being flown out to Europe with the nuns. "We thought we were going to Belgium," recalled Bitu Bingi, "that Papa l'État was going to take us and be in charge, along with our mother, [Belgian] Queen Fabiola. Ooh la la! We were proud. I thought, 'I'm going to eat cakes every day.'"

They boarded the bus, which drove as far as a town called Lusambo, across a river from the airport. There the girls watched as some of the women climbed into a long canoe, dismounted on the other side, and then proceeded to board the waiting plane. A priest informed the children that there wouldn't be room for everyone after all; they would be returning to Katende. Weeks later, said Bitu Bingi, five trucks bearing the insignia of the United Nations pulled into their compound late at night. The clergyman and the remaining nuns filed toward the vehicles with their suitcases, and they all drove hastily away. Left behind were nine métisse girls and 20 or so of the newborn orphans. For three months, the girls survived on fruit, mushrooms and whatever else they scrounged up around the mission. Most nights, they would be jostled awake by wild-eyed combatants brandishing the hands of their fallen en-

^
Léa Tavares Mujinga. She arrived at the Katende mission around 1946 at almost 3. She spent more than a decade there and helped care for other abducted girls.

LAURA STEVENS

> “We were told we were **‘the children of sin.’** The sisters, the population, everyone called us that.”

emies. (This particular war ritual had deep roots in the region: Under King Leopold, state agents were required to cut the right hands from the Congolese they had murdered, as proof of both the number dead and that the king’s precious bullets had not gone to waste.) They forced the girls to watch as they dumped the bloody trophies—sometimes as many as 50 or 60 of them—into a nearby ditch. Enemies captured alive would be marched down to the river and shot, their corpses left to float downstream. “We saw many, many dead bodies,” said Bitu Bingi. Eventually, police officers arrived, having been sent to protect the children. At night they would order the girls to lie in the dirt and spread their legs. “We’ll show you how babies are made,” they would say, penetrating the prepubescent girls with long candles.

When a local administrator learned that the girls were being abused, he divided them among some families nearby. Most were reasonably well taken care of, but there were some reports of sexual assault by guardians during those months after Katende.

In mid-1961, Bitu Bingi managed to hitch a ride back to Katende with a truck full of soldiers hopped up for war. They settled her into the flatbed among their machetes, spears and arrows. At the mission, she ran around grabbing sugar, dried fish and salt—whatever she could get her hands on—then stopped in to check on the abandoned orphans. “I went to look for them,” she said. She found graves. “This one was dead and this one was dead. Three-quarters of them were dead.” A local woman came to look after the babies who’d survived. A few days later, Bitu Bingi flagged the soldiers down for a ride back and was hoisted onto a flatbed now pulsing with the grisly aftermath of their fight. Between the disembodied arms and legs and the bloody hands, she said, “I didn’t know where to look.”

* * *

IT WAS IN THE YEARS after World War I that Belgium gained control of the territory known as Ruanda-Urundi, which became the independent countries of Rwanda and Burundi in 1962. There, the métis children, as wards of the state, were marched onto airplanes and flown to Belgium for placement with foster families or in orphanages.

From the beginning of its time in the region, the colonial power favored members of the Tutsi tribe over those of the more numerous Hutus. The Europeans’ preference for Tutsi women was evident in the métis population, the majority of which tended to be of Tutsi ancestry. In large part because of the Belgians’ discrimination, tribal tensions in the region had been rising since the mid-1950s, with Tutsis already beginning to be murdered. On the eve of independence, the state agreed to “evacuate” the children on grounds of escalating violence in the region.

Jacqui Goegebeur was just 5 months old when her Belgian father died of a heart attack. (She has a single photo of him,

Few of the displaced biracial people, known as *métis*, have mementos from their previous lives, but Goegebeur has a picture of her father with a baby zebra.

> “I knew I couldn’t sit down with the child in front of me and tell them **how much pain I have.**”

holding a zebra.) Colonial officials moved Goegebeur’s 6-year-old brother to one mission and sent her and her 5-year-old sister, Fréderique, to a place that local residents called the White Sisters, run by Catholic nuns in an area called Save, in southern Rwanda. Three years later, in 1959, the girls were flown to Belgium, where Goegebeur was placed with a family of three in the coastal town of Blankenberge, in the Dutch-speaking part of the country. Fréderique grew up with a family 80 miles away. According to Goegebeur, the idea was that she would serve as playmate to the couple’s 12-year-old daughter. “Only she’d never asked for a sister.” When the two would go out together, her foster sister would be careful to walk several yards ahead.

One night, when Goegebeur was 9, her 18-year-old foster sister came bounding into her room to tell her all about how she’d fallen in love. “But you will never get that,” the older girl said, “because you are Black.” That was the first time, Goegebeur said, “that I was aware there was a problem with me.” (For her part, Goegebeur’s foster sister does not recollect their past in the same way: “About our shared history, I don’t recognize Jacqui’s story at all.”)

The now-67-year-old, who recounted her story over cappuccinos in a Brussels coffee shop, would later learn that her birth father had left money for her upbringing and education, but her foster family dispersed only meager amounts, telling Goegebeur, for example, that she didn’t really need to eat meat and offering her sheets to rip up when she was menstruating. Her foster sister, meanwhile, would be provided with store-bought tampons. One of the nuns at Goegebeur’s Catholic high school told her that she was lucky she wasn’t a pig, “because when pigs mix race, the babies are born with several colors.”

At the age of 18, having finally taken the birth certificate and other files that she’d discovered as an 11-year-old rifling through her foster father’s office, Goegebeur left the family for good, matriculating at a university in Ghent. “You see a birth certificate,” she said, “you see letters from nuns, but you don’t understand. Really understanding, that is something very new for us.”

■

PERHAPS MORE THAN ANY OTHER imperial power, Belgium has resisted reckoning with its colonial past. For generations, its citizens seem to have alternated between maintaining a stony silence and outright glorifying life in the former colonies. A bronze statue of a horse-mounted Leopold still occupies a place of pride in central Brussels, and one of the city’s main routes, the boulevard Général Jacques, commemorates a man who, when confronted with rebelling Congolese laborers, vowed “absolute submission” or “complete extermination.” A 2022 survey conducted by the University of Antwerp and

Jacqui Goegebeur. Led to believe her mother did not want her, she later learned the woman had made multiple attempts to hide her and her siblings from Belgian officials.

BYLINES

Writer **Jocelyn C. Zuckerman** is the author of *Planet Palm: How Palm Oil Ended Up in Everything—and Endangered the World.*

Laura Stevens has an upcoming exhibition at Galerie Miranda in Paris, France.

Thomas Freteur recently curated an exhibition on the impact of communitarian radios in the Democratic Republic of Congo.

LAURA STEVENS (2)

THOMAS FRETEUR

Belgium's AfricaMuseum found that out of 12 questions asked about the country's imperialism, respondents, who were representative of the national population, could answer an average of just four correctly. Only 70 percent knew which king had taken possession of the Congo as a private state, and barely any could name the three African nations formerly under Belgian rule.

The year 2008 marked a century since the Belgian state took direct control over Leopold's African holdings, and Goegebeur, feeling offended by the media barrage celebrating "that big, beautiful period" of colonialism, decided she needed to do something. She would go on to co-found two organizations, miXed2010 and the Métis of Belgium Association, both dedicated to helping fellow métis find community, raise awareness about their plight and lobby the government to address their ongoing challenges. Because colonial agents had routinely changed the names of métis toddlers and falsified documents so the children would be unable to track down their European fathers, many métis continue to lack birth certificates and have been unable to gain Belgian citizenship.

The logistical nightmares only compound a lifelong sense of rootlessness and alienation. When Goegebeur was 21, she flew back to Rwanda in hopes of finding her mother. Disembarking in Kigali, surrounded by Black people, she remembers feeling disoriented and profoundly lonely. "I was used to white people," she said.

The Belgian Catholic Church issued a statement in 2017 apologizing for the role it played **in the abductions.**

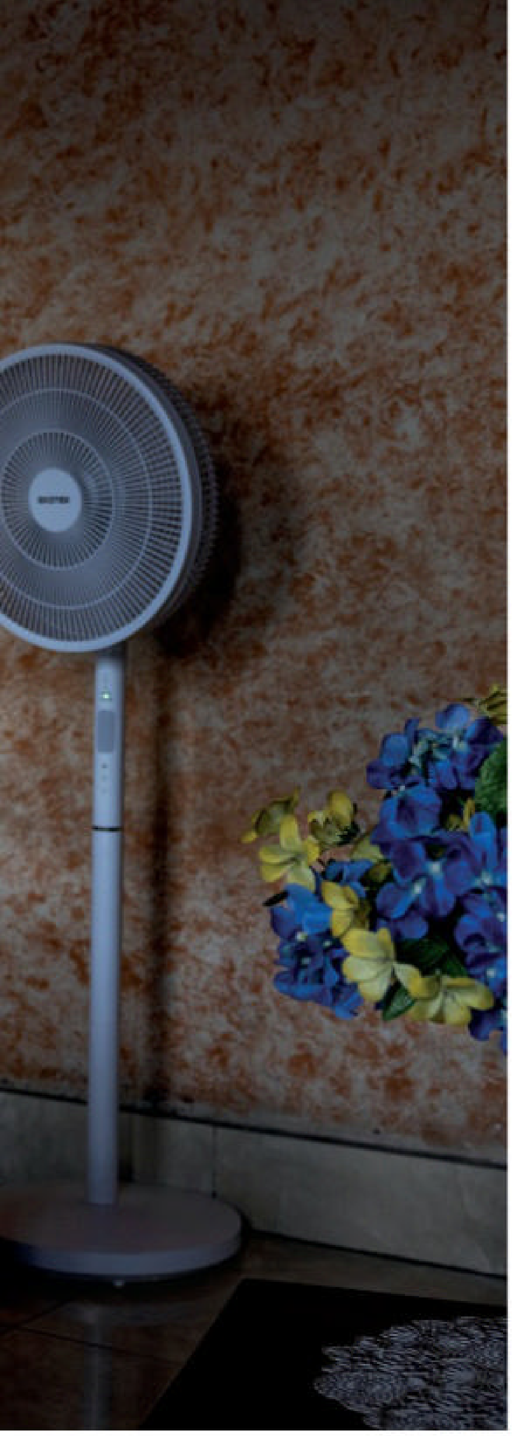
Everyone that Goegebeur had told about her plans to return to Africa had warned her. "Be careful," they said. Sure enough, she said, when she arrived in the village where her mom was living, "All the clichés they said would happen, happened. She told me lies. She said, 'I'm so lonely.' And those who translated said, 'Oh, she's not lonely. She has a husband there.' And then she asked for money."

Goegebeur's sister, Fréderique, hadn't wanted Jacqui to go in the first place. The older girl had been 5 when the two were taken away by the gendarmerie, and Fréderique's memory was of a mother standing there motionless, with a blank expression on her face. She hadn't even cried. "Her idea was that she was a cold woman," said Goegebeur. "We were taught to think about our mothers as uncivilized, careless people."

In 2014, after retrieving her sister's files from the government archives in Flanders (Fréderique died of cancer two years later), Goegebeur learned that their mother had twice hidden her daughters from the police and that they were taken from her only on the third attempt. However, the clarity came too late. Her mom and aunts had all been murdered in the 1994 genocide—which took the lives of several hundred thousand Tutsis over the course of three months. She'd learned of her mother's death previously from fellow métisses.

Bitu Bingi, who welcomed me into her house in a quiet town on the Flemish-speaking side of Belgium, once returned to her birth village, and she briefly reunited with her mother, who explained that she'd run off that night in 1953 because she couldn't bear to see her baby girl taken away. Still, having lived apart for two decades, the feelings the two once had for each other never returned. "This was 'a child of sin,'" Bitu Bingi's youngest daughter, Monique Fernandes, offered as an explanation. "They had already begun to break the love between the mother and the child."

In the intervening years, Bitu Bingi's mother had married a Congolese man and given birth to other children. "You have to understand," Bitu Bingi said, "when you grow up without someone . . . " She trailed off.



Simone Ngalula. She was separated from her brothers at 3, when a grandfather left her at Katende. Reunited, she visits her siblings regularly.

Even today, Jacqui Goegebeur can’t talk about her past with her two adult daughters. “That’s one of the reasons I started doing this work,” she said, “because I knew I couldn’t sit down with the child in front of me and tell them how much pain I have.”

* * *

BELGIUM, FINALLY, has begun to confront the reality of its imperial past. In 2018, the Royal Museum for Central Africa, located in a Brussels suburb called Tervuren, reopened as the AfricaMuseum after a five-year overhaul aimed at undoing its longtime reputation as a bastion of colonial propaganda. Also that year, the country renamed a square in the capital city after Patrice Lumumba, the first prime minister of the Democratic Republic of Congo, who was assassinated by political opponents (with the complicity of the Belgian state) in 1961. And, thanks in large part to lobbying by Goegebeur and others, the métis question has finally become the subject of a national discussion.

In March 2018, Belgium’s Chamber of Representatives unanimously passed something called the Métis Resolution, mandating that the government find administrative solutions to the problems that continue to result from “the segregation of métis who were victims under the Belgian colonial administration.” A team of researchers has begun to sift through the thousands of documents hurriedly transported out of the Belgian Congo at independence and Ruanda-Urundi shortly thereafter; likewise, it is reviewing documents kept by the Association for the Protection of Mulâtres, the main organization responsible in the 1950s and ’60s for placing mixed-race children with Belgian families. The materials are being entered into a database, which will allow researchers to assist survivors looking to learn about their identities and reconstruct their histories. The researchers also have created a virtual exhibition documenting stories of the métis. The resolution, for which the state has already earmarked €1.9 million, also mandates that the government underwrite a comprehensive study of the métis, exploring the role played by Belgian authorities at the political, administrative, legal and religious levels. “It’s really extraordinary that they adopted these resolutions that take these very strong engagements,” said Delphine Lauwers, the archivist overseeing the project. “This initiative is not just legal or social or historic. It’s really a very vast question that traverses the entire period—all aspects of colonial life.”

Even given the considerable resources devoted to the project, said Lauwers, who has a PhD in history and has done research on the Rwandan genocide tribunals, it is proving exceptionally complex. Not only are there thousands of victims involved, but some of the files—particularly those linked to the ministries of defense and foreign affairs (the successor to the colonial administration)—remain inaccessible because of legal obstacles. And though the Belgian Catholic Church issued a statement in 2017 apologizing for the role it played in the abductions and asking Catholic institutions in Belgium, Africa and Rome to make available all documents that might help survivors find their ancestry, they are technically private and logistically difficult to access.

* * *

“I’VE HAD THIS BAG for 40 years,” Bitu Bingi said, setting down a black-and-gold-striped canvas carryall on her dining room table. The soft-spoken mother of seven moved to this quaint village in 1981, after the death of her Congolese husband. “I wanted my children to be people of the world,” she said. A few years later, she traveled back to the mission in Katende and asked the mother superior, now a Congolese woman, for access to the school’s old files. She was given the key to a rickety armoire, inside of which she found piles of old folders. “I took everything,” she said.

In the early 1960s, when mixed-race children lived at Katende, the United Nations sent troops to the Congo to try to stabilize the country at war.

FOTOTECA GILARDI SNC / AKG-IMAGES

She opened a faded blue exam book with the word “mulâtresses” written on the cover in neat cursive. At the top of the first page appears the date “September 1958” in the same careful hand. Twenty-three names, including those of Bitu Bingi, Ngalula and Tavares Mujinga, are listed underneath. Fernandes pulled out a *feuille de route*, or travel order, along with a roadmap with instructions on how to get to Katende. Among the documents Bitu Bingi collected was a 1953 telegram informing the nuns that an agent would be accompanying her friend Ngalula and her two brothers to the school. "*L'enfant mulâtre VANDENBROECK Simone*," it reads, "*née le 13.4.1950.*" Ngalula hadn't known her father's last name until Bitu Bingi returned from Congo with the files. "They didn't want to give me the name Vandenbroeck," Ngalula said sadly.

"That's me," Bitu Bingi said, pointing to an impish-looking child in a group photograph. "She's the one who punished me," she went on, singling out a nun and describing how once, after climbing a tree at the age of 8 or 9 to pick oranges, Bitu Bingi had been ordered to harvest habanero chiles every morning for a week. Repeatedly thrusting her throbbing fingers in and out of a bucket of water had done nothing to relieve the excruciating burning sensation that resulted.

The bag also held some newer documents. Bitu Bingi pulled out a correspondence with Queen Fabiola from the year that she arrived in Belgium. "I was really sure my queen was going to help me, because I had never asked her for anything," she said.

Tavares Mujinga, who moved to Belgium from Congo in 1988 after the death of her mixed-race husband, also said that she'd written to the queen. "I am here in Belgium," the letter read, "my husband is dead. I have four children. I could use a little help." Both women received replies, on thick letterhead featuring a pink embossed crown, that assured them the queen had read their letters. She referred them to the Public Centers for Social Assistance, Belgium's welfare administration.

"If Belgium doesn't face this story, the **trauma will be passed down** from generation to generation."

It wasn't thanks to the government, but Bitu Bingi has enjoyed one victory along the way. In early 2014, one of her five sons, Serge, took the train to his mother's house from his home in Paris to introduce her to his new baby. He'd been poking around online, he told her during the visit, and had found someone with the same name as her dad, Dumont. Fernandes contacted the man through the genealogy site where Serge found him and sent him a note. A week went by, and she was disappointed to see that he hadn't replied, but she did notice an Argentine flag on his profile. With the help of Google Translate, she re-sent her message, this time in Spanish. "I think my mother is your half-sister," she wrote.

Two weeks later, in March 2014, Bitu Bingi boarded a plane in Brussels with Fernandes, Serge and one of her other sons. Stepping into the arrivals lounge in Chaco, Argentina, the four were greeted by dozens of cheering, never-before-met relatives, many of them blond and blue-eyed. "Welcome!" read their hand-lettered signs and banners. "Family of the World!" Bitu Bingi and Dumont ran immediately to each other and stood in a tight embrace, tears streaming down their cheeks.

"The Belgian state had told her that her father didn't care," said Fernandes, "that he didn't want anything to do with her." In fact, her dad, whose first wife, an Argentine, had died in a plane crash after giving birth to three children, had told his kids to one day look for their half-sister.

"Now, she's found these ten brothers and sisters and their children and their grandchildren," said Fernandes, "a whole family, at the age of 65."

* * *

TAVARES MUJINGA, NGALULA and another Katende alumna, Marie-José Loshi, were sharing one of their regular meals together in 2018 (they're the closest of friends) and debating whether the government's métis initiative was likely to have any impact on their lives. Bitu Bingi still tenses up every time a truck rumbles past her house. "The nightmares never end," she said. "That the military trucks are coming, that we are running away. The body parts, the babies, all of that. I would like to ask the state, 'How can I keep all of that in my head for all these years?'"

Again it was Fernandes who took the initiative, reaching out to Brussels-based lawyer Michèle Hirsch, who worked with victims of rape and other violent crimes. At first, Hirsch declined a meeting with the women, explaining that she only deals with criminal law. "Yes," Fernandes told her. "That's exactly what we need." A few weeks later, five alumnae of Katende rang the buzzer at the offices of Hirsch & Vanhaelst, on a leafy street in Brussels' upscale Louise neighborhood. They were Bitu Bingi, Tavares Mujinga, Ngalula, Loshi and Noëlle Verbeken. One by one, the women, gathered around a conference table, recounted the full stories of their girlhoods, most of them for the very first time.

"They hadn't even told their children," Hirsch said. "That is part of the trauma. We saw that with the Holocaust and with the genocide in Rwanda. I met women; they didn't talk of their own experiences of being raped, but they told the stories of their husbands, their sons, who had been murdered.

"We didn't understand immediately," she went on. "We had never heard about this." Hirsch, who has a quiet ferocity and a penchant for chunky jewelry, began digging into the state archives, engaging academic experts and, with her colleagues, creating dossiers for the five women. "These documents are extraordinary," she said. "They prove that the Belgian state, during colonization, put in place a system to take very young

Marie-José Loshi. She's a plaintiff in a lawsuit accusing the Belgian government of crimes against humanity for forcibly removing children from their families. in the Congo River Basin.

THOMAS FRETEUR

children, between 2 and 4 years old, from their mothers, all of them métisses, to put them under the power of the state, and place them by force in religious institutions in a manner to preserve the supremacy of whites. This was not an orphan," she continued. "This was not an abandoned child. The church sequestered these children. All of that was dressed up in decrees and rules."

Because none of the individuals responsible for the system remain alive today, Hirsch and her clients took their case to the state, bringing civil suit against the government. They requested reparations of a mere €50,000 per person and the appointment of an expert to assess the mental, physical and financial hardships the women have suffered. They settled on the small sum because losing the case would mean paying a portion of the state's legal fees.

The Catholic Church is not part of the women's lawsuit, but that doesn't mean it bears no responsibility for the atrocities. "Without the church, there would have been no way to put the system in place," said Hirsch. "The state delegated the power to the church, with the understanding that the church would not let the kids go back to their families. . . . In order to get paid, the church needed the documents saying, 'We entrust this child to you.'"

Hirsch emphasizes that the oldest plaintiff in the suit, Tavares Mujinga, arrived at Katende in 1948. That was three years after the Allies in World War II had established the concept of a crime against humanity, defining it as "murder, extermination, enslavement, deportation and other inhumane acts committed against any civilian population, before or during the war." They also referred to persecutions "on political, racial or religious grounds."

Hirsch could imagine the sort of arguments she and her clients would hear, including equivocation with Leopold's atrocities. "Everyone is going to tell us, 'Yes, and they cut their hands off, and they did this and that in these other countries . . .' No! Our clients are living, and when they were children, after 1948, they took these measures in Belgian territory. Since when," she continued, "when one commits a crime, do they say, '*Excusez-moi*'? That's valuable to whom? A state must take responsibility."

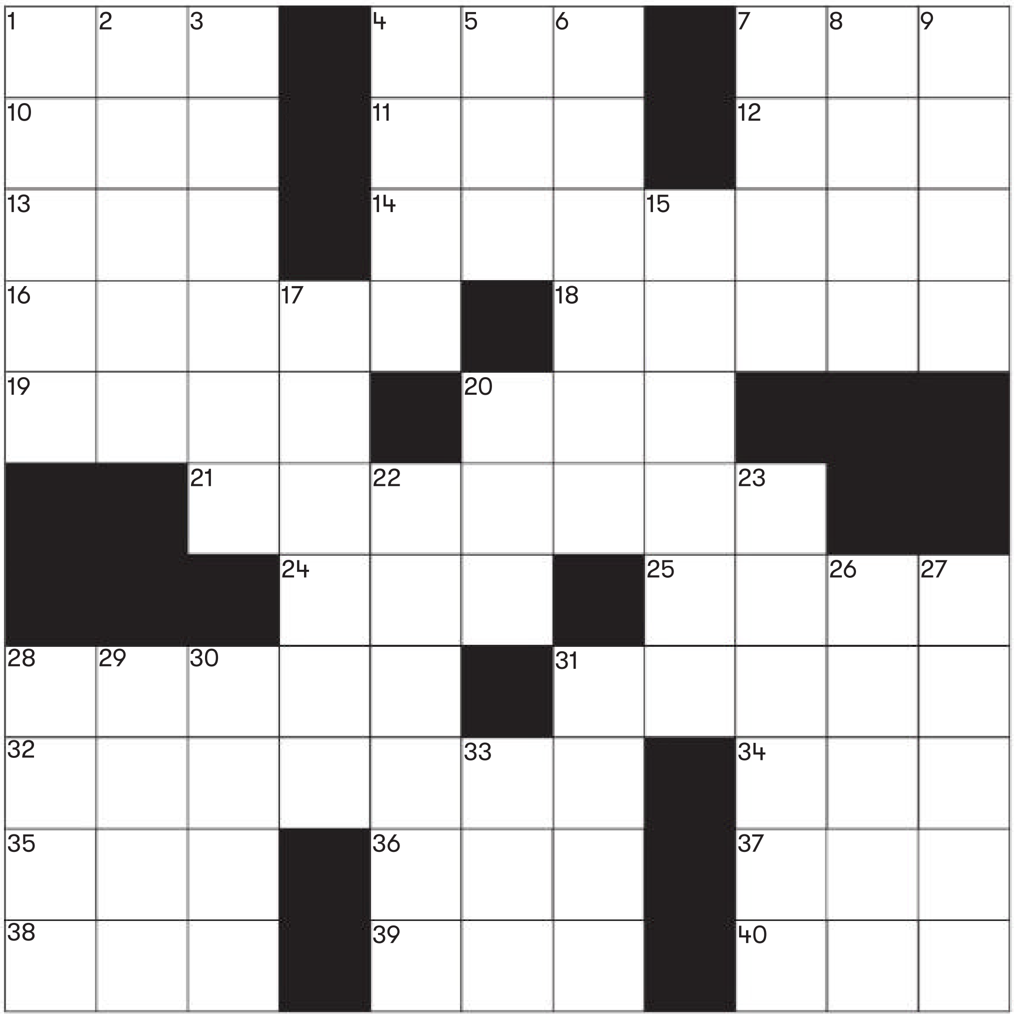
■

ON A CHILLY AFTERNOON in October 2021, Goegebeur and a few hundred others crammed into a nondescript courtroom in downtown Brussels to lend support to the five métisse plaintiffs. During the hearing, which lasted only a few hours and did not include live testimony, Hirsch argued that her clients had been "abducted, abused, ignored and expelled from the world. They are living proof of an unconfessed state crime,

Don’t Be Puzzled

YOU CAN FIND 11 ANSWERS IN THESE PAGES

By **Sam Ezersky**



Across

1 More, in Mexico
4 Letters before *Constitution*
7 Selfie, e.g.
10 “Able was I ___ I saw Elba” (famous palindrome)
11 Informal instant
12 Critical hospital locale
13 Job for a AAA vehicle
14 Workers at Westminster Abbey
16 “Wait, did ___ something?”
18 Gets together with
19 Yemen’s capital, as it’s sometimes spelled
20 Well-suited
21 One of many that cover 10 percent of earth’s land
24 “Live” tree in the hull of Old Ironsides
25 Animals with methanogens living in one of their four stomach compartments
28 Retort to “Are so!”
31 “Quit ___!” (“Enough already!”)
32 Purported quality of Frank Johnson’s jazz
34 Dr. of rap music
35 Do some lawn work
36 Square on a phone screen
37 Quirky
38 Suffix with differ
39 What “5” might mean
40 December 31, for short

Down

1 People at the heart of a campaign to right a wrong in Belgium’s history
2 Pleasant smell
3 Area of expertise for Leah Maguire
4 Some computer ports
5 “Get it?”
6 Garlicky shrimp dish
7 ___ burn, first step for setting a controlled fire
8 Rapper-turned-actor on “Law & Order: SVU”
9 Say “$%&#!,” say
17 Western watering hole
20 Cutesy comics cry
22 Many a minor-league ball club
23 Amazon explorer alongside Roosevelt in the 1910s
26 Overly verbose
27 Person from Stockholm
28 Phrase said with a sigh
29 New ___, homestead in Lucy Maud Montgomery’s writing
30 Food package abbr.
31 Kids’ road trip game
33 Health resort spot

See the solution on Page 124.

and soon there will be no one left to testify.” The government’s lawyer acknowledged that the policies in question had been racist and shameful. But he maintained that the policies hadn’t been seen as violating fundamental rights at the time they were put in place. Besides, he said, if the state were to make payouts to these women, how many of the other approximately 4,000 métis in Belgium would file lawsuits?

In his decision, delivered two months later, the judge sided with the state. The public response, in keeping with the larger societal trend toward denial about the colonial past, was muted. “A part of Belgian society, mostly, but not exclusively, the older generations, still seems somewhat hesitant at the idea of recognizing too many wrongs, and some of our politicians still insist on highlighting ‘the good sides of colonization,’” Lauwers, the archivist, explained. After two years of interviews and hearings, a parliamentary commission set up in 2020 was unable to persuade the Belgian Chamber of Representatives to issue even an apology.

Hirsch and her clients have appealed the ruling and have been given a deadline of May 2023 to submit final arguments. (Goegebeur, for her part, has been working with the Switzerland-based organization Justice Initiative, which focuses on child abuse. She believes that the métis may have a sound legal case in the European Union, predicated on the systematic discrimination and violation of the rights of a child.)

Hirsch points to Canada and Australia, both of which publicly reckoned with discriminatory policies involving Indigenous and “half-caste” children in 2021. In the former case, several lawsuits have led to settlements in the billions of dollars for the harm done to Indigenous people through a system of mandatory residential schools that a national commission called “cultural genocide.” Australia’s government agreed to pay $280 million to survivors who were removed from their families in federally controlled areas of the country. The United States recently acknowledged its role in an assimilation campaign that required Native American families to send their children to government-run boarding schools during the turn of the 20th century. Hirsch believes Belgium will eventually acknowledge its past crimes and enact reparations for all métis taken from their families. In the meantime, she is adamant that her clients will prevail.

“If Belgium doesn’t face this story,” Bitu Bingi said, “the trauma will be passed down from generation to generation. It did it. It must pay.” ◆

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The quire, in the center of the nave. The stalls, reserved for choristers, clergy and visiting diplomats, date from 1848; the checkered floor is from 1677.

Westminster

CONTINUED FROM PAGE 52

the dean of Westminster Abbey and your job is to invite people into this place to find their place in the nation's long story, that's getting really difficult."

◆

EVENSONG, the day's final service, is always busy. The choristers stand in their stalls wearing white surplices over red cassocks and white ruffs. None of the boys is older than 13, yet they do not seem like children. They are vessels for sound. There is so much that is solid in the abbey: the tombs, the architecture, the effigies of wax and wood. But the music, heard every day here for centuries, cannot be touched or held. It happens and then it is gone, but somehow it gets into the stones.

The boys are boarders at the choir school. There are, on average, eight choral services a week, plus daily rehearsals. Now the boys sing the Magnificat, the song of Mary, their voices rising to the ribs of the vault. Evensong is an opportunity, whether you are a believer or not, to experience the numinous. A chance to leave behind for a time the quarrels and weary cares of the present.

The sky grows dark behind the windows, and I think of Daisy McDonnell, a marshal who had shown me around earlier. She is only 29. A little girl when Princess Diana had her funeral here, a teenager when Prince William and Kate Middleton got married, not yet 30 when the queen died, but she is already part of abbey time, caught up in that grand sweep. "The abbey holds so much history, and continues to make history," she had said, shrugging. "It's just what we do."

There is an intense feeling here of compressed narrative and time. An oak is axed in an Essex forest. It is made into a door for a church, then another church. Monks and priests pass through; monarchs pass by and pass on. The church is on an island, then it is not. It is part of a great city. It survives a Great Fire. Enemy aircraft fly overhead and drop their bombs. London is in flames again, but it survives, as it did centuries before. Elizabeth II is crowned, mourned, and the crown passes on. Then, as now, the people who work here are custodians. They inherit this place in each generation and will bequeath their duties to whomever comes next. The story of Westminster Abbey began with a felled oak. It has not ended yet. ◆

BYLINES

Peter Ross is the author of *A Tomb With a View* and the forthcoming *Steeple Chasing: Around Britain by Church.*

Photographer **Jooney Woodward's** last story for *Smithsonian* was about the search for King Arthur.

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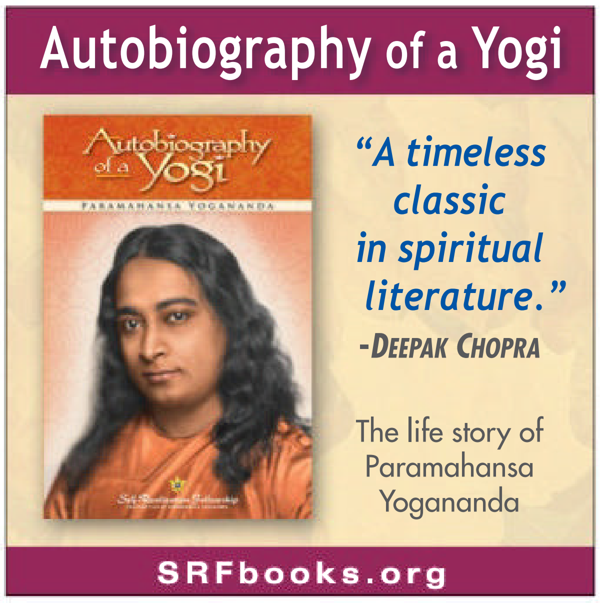
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Amazon

CONTINUED FROM PAGE 65

in this great work of exploration."

On May 7, Rondon and Roosevelt said goodbye in Belém, at the mouth of the Amazon. Meeting with reporters, his ill health evident, Roosevelt emphasized the expedition's accomplishments: "We have put on the map a river nearly one thousand miles long," he said. "It is the biggest tributary of the biggest tributary of the most magnificent river in the world."

Then Rondon and the other Brazilians came on board the steamship *Aidan* to say goodbye. Roosevelt shook hands with every camarada, gave each two gold sovereigns and made a speech, which Kermit translated into Portuguese. "You are all heroes," he told them, adding that they were "a fine set—brave, patient, obedient and enduring." Nor was Simplício forgotten: Roosevelt directed that his gold coins be sent to his mother.

Roosevelt was even more effusive about the officers, and whatever disagreements had divided him and Rondon during their trip now gave way to what Rondon described as a mutual affection "spontaneously born of the dangerous but beautiful deed that together we had just accomplished."

Roosevelt concluded by inviting Rondon to visit him at his home in Sagamore Hill, New York. Smiling, Rondon replied, "I'll be there when you are again elected president of the United States, to attend your swearing-in." But though they would occasionally write, Rondon and Roosevelt never saw each other again. In fact, Roosevelt never made another try at the presidency, and though there was talk of his possibly running in 1920, he didn't live that long, dying at Sagamore Hill on January 6, 1919, at the age of 60.

Of the principal expedition members, Rondon would live the longest, and he participated in a dozen more missions. He died in 1958, at the age of 92. Although he remains little known outside Brazil, in his homeland he is a hero whose face has appeared on currency and whose name graces streets, squares, museums, airports, government buildings, cities, counties and even a state: Rondônia. ◆

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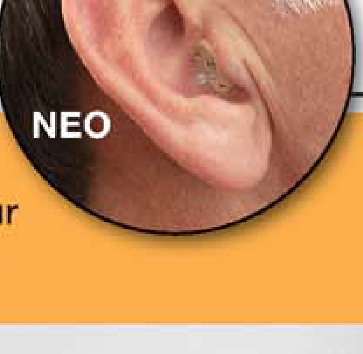

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Methane

CONTINUED FROM PAGE 87

early on to build a digester. "Sustainability to me means not importing nitrogen from Russia, not relying on an outside sawmill for bedding, being a better neighbor because we aren't adding manure to our fields," he says. "I've also never felt so interconnected with my community and the food system. And it feels really good to know that we make enough electricity to power almost every home in this community."

On a wet September morning a few months later, a thick fog cloaks the mountainside trees behind the Barstows' milking barn. A tanker truck is parked nearby, its waste flowing into the digester. The family is about to bring in their fifth cutting of hay fertilized with the digester's organic matter. "We used to get four," Barstow Manz says, "but because of the anaerobic digester we are now getting five."

As the weather grows colder, the barn's sides come down and the family's mindset shifts from crops to winter equipment maintenance. The cows are content, feeding the digester with their manure. As David Barstow puts it, "We're not getting rich, but it's like everything else we do. It all adds to the bottom line."

The Barstow family has worked this land for 217 years, and Barstow Manz has been contemplating the next generation, the eighth—her cousins' kids and her own future children. "We have to continue to adapt and adjust," she says. Winter is coming, but they'll be fine, even in hard times. The digester will keep them warm. ◆

Answers from Page 118.

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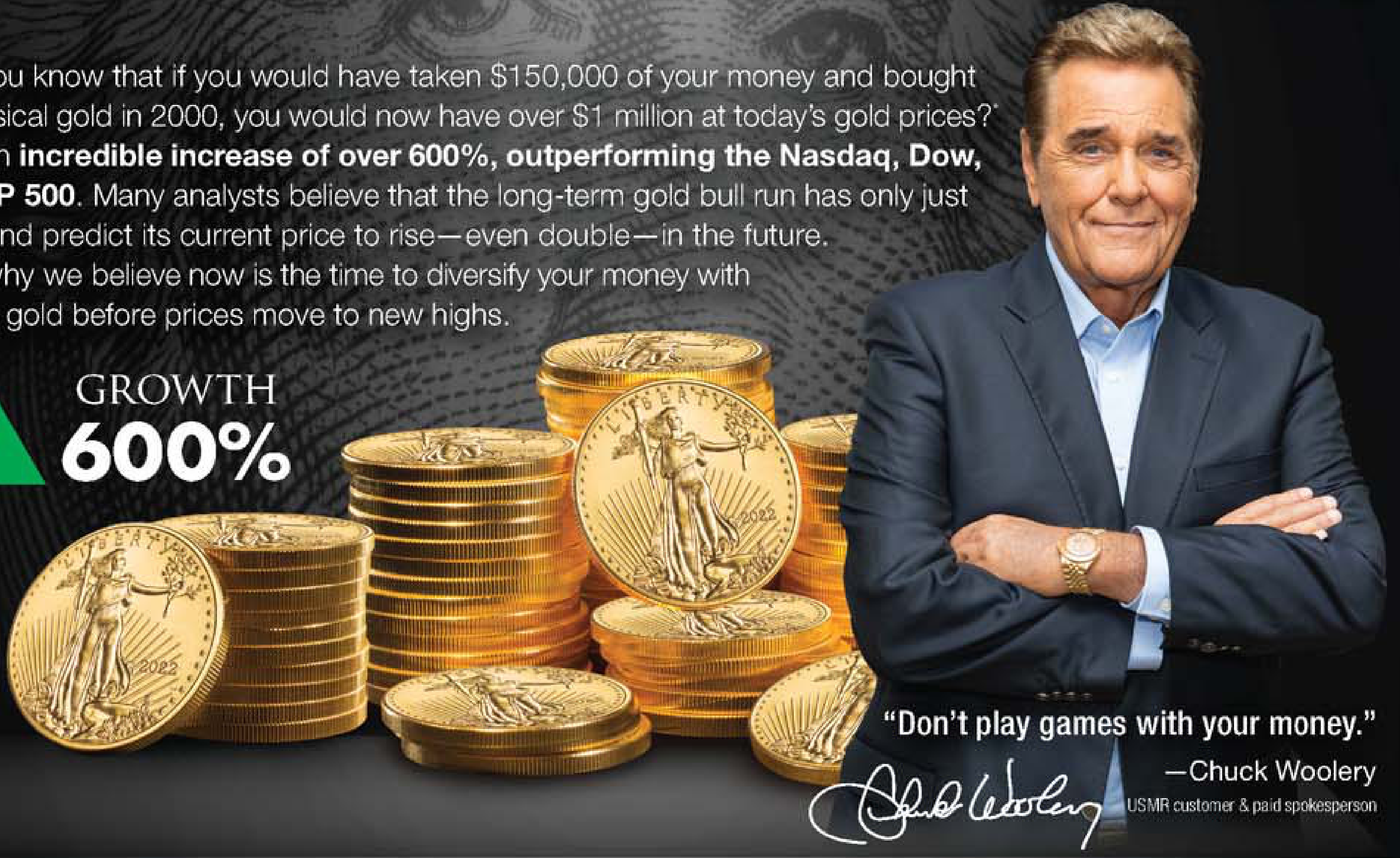

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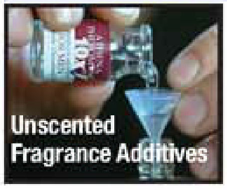
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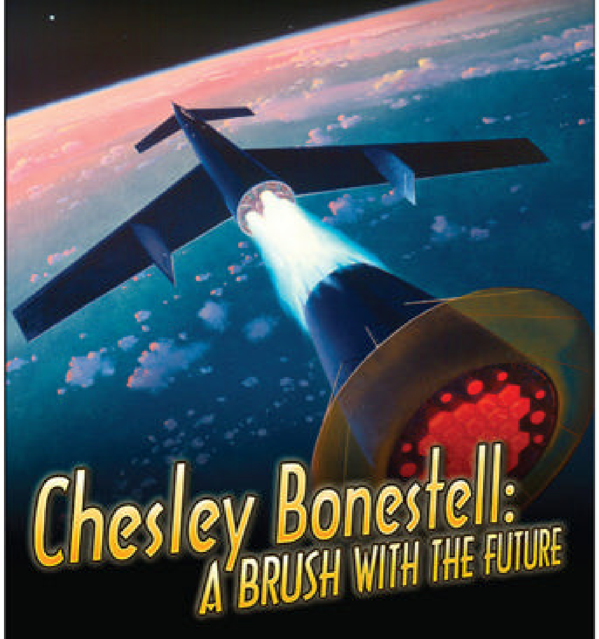

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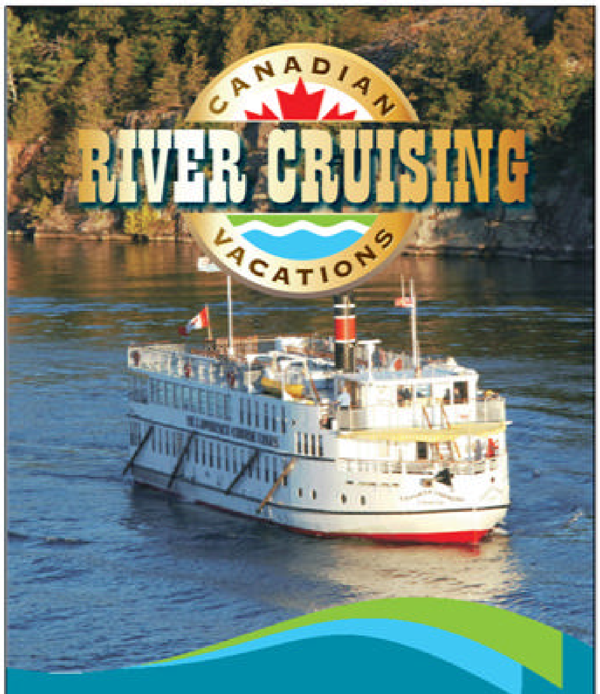

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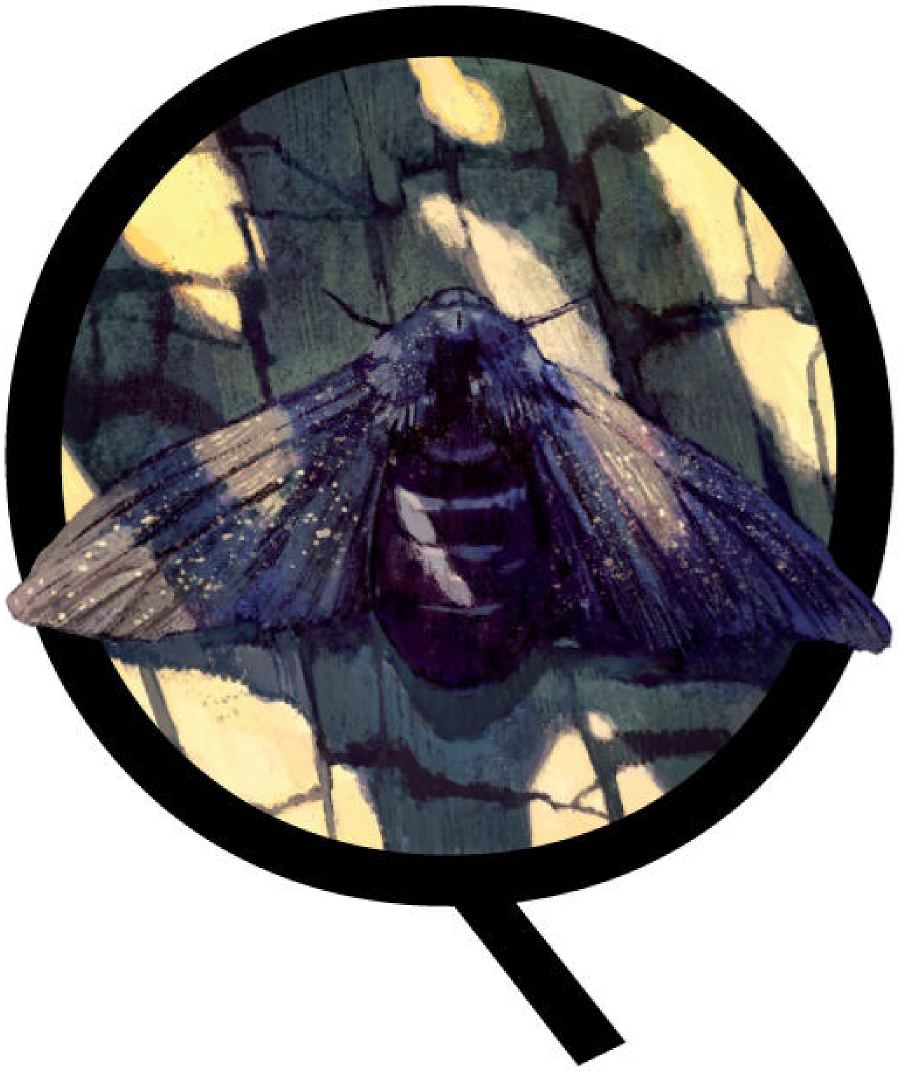

Q: Have any modern animals adapted to human activity through natural selection?

Mike Anglin | Dallas, Texas

HUMAN-CAUSED FACTORS have led to anatomical changes in both vertebrates and invertebrates. One example is the peppered moth: In the early 20th century, air pollution killed the lichens they camouflaged on, exposing dark tree bark. The typical light form of the moth started getting preyed upon at a higher rate than its darker counterparts, resulting in a darker species. Similar cases can be found in more than 70 species of moth and butterfly. As pollution levels declined due to regulation, the melanism in these creatures reversed.

Floyd Shockley, *entomologist,*
National Museum of Natural History

Q: How did engineers in antiquity do elaborate calculations using Roman numerals?

John Davison | Langhorne, Pennsylvania

IT'S DIFFICULT TO KNOW how much ancient engineers relied on intuition and geometry. Our knowledge of how the Romans used architectural drawings—let alone the mathematics they used to produce them—is also quite limited. We do know that from ancient Roman times through the Middle Ages, Europeans made calculations using the abacus and the counting board; the former used beads, while the latter involved stones or discs called counters. The widespread adoption of Arabic numerals in the 1400s opened the way for more complex forms of mathematics, including algebra—a word that comes from the Arabic *al-jabr*, the reunion of broken parts.

Peggy Kidwell, *curator of medicine and science,*
National Museum of American History

Q: When fish swim down to deeper levels of the ocean and back up again, does it affect the pressure in their bodies the way altitude shifts or deep-sea diving affects humans' bodies?

Steven Clark | Arlington, Texas

CHANGES IN DEPTH do not generally affect fish the same way pressure changes in altitude affect people, because fish lack lungs. However, most fish do have an enclosed air sac called a swim bladder. They can move air in and out of that sac to help them with buoyancy. But this is a slow process, and if a fish comes up too rapidly (for example, if it's caught on a fishing hook in deep water and then is quickly reeled to the surface), the pressure change can be fatal, because the swim bladder can't be deflated fast enough.

Carole Baldwin, *chair of vertebrate zoology,*
National Museum of Natural History

Q: Why do many states have such odd shapes, with wavy natural borders on some sides and straight lines on others?

Raymond Lopez | Newtown Square, Pennsylvania

THE BORDERS OF THE ORIGINAL 13 colonies were based on land grants from the British crown, though it took some debate to settle their final boundaries. Natural features played a role in state shapes across the nation, as did railroads and canals. Straight boundaries west of the Appalachians were defined by the public land survey, using latitude and longitude. Due to limitations in surveying methods, many of those lines weren't perfectly straight and needed corrections along the way. Slavery also influenced many state borders. Internationally, U.S. borders were established by treaties with the U.K./Canada and Mexico.

Daniel G. Cole, *chief cartographer,*
Smithsonian Institution

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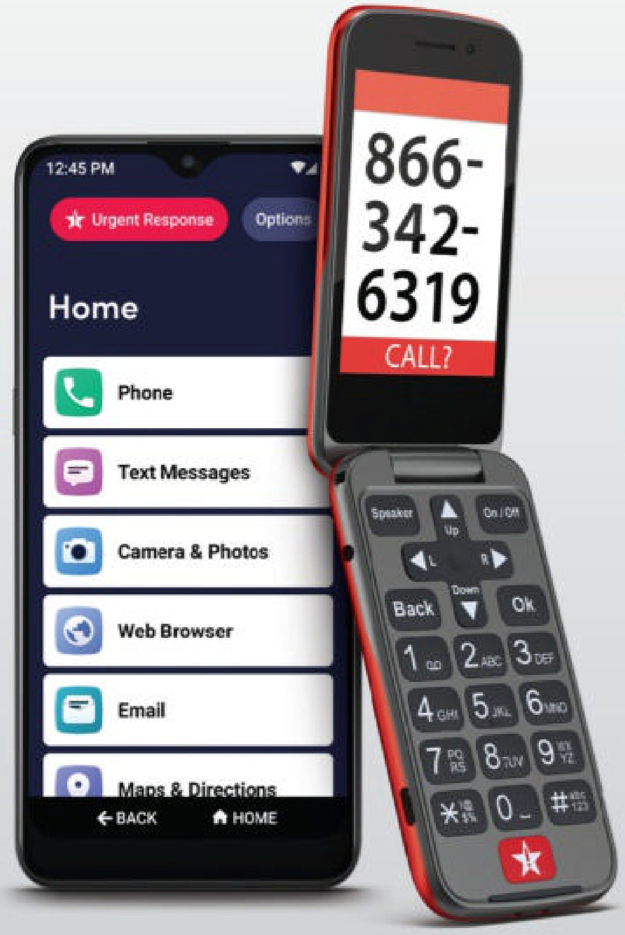

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